PEST CONTROL

FEBRUARY 1958

TERMITE ISSUE

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There's Nothing Marginal About This Houston, Tex. TO's Sub-Slab Jobs--Read How He Does It . . . Pg. 38

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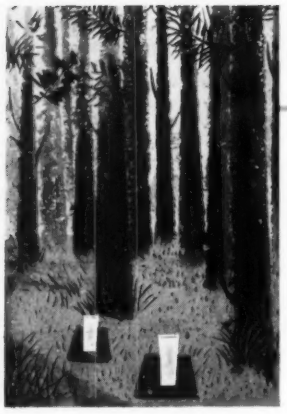

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Location: USDA Southern Forest Experiment Station, Gulfport, Miss. All vegetation was removed from a 17 inch square of soil. Chemicals were sprinkled evenly over soil surface. After chemicals soaked in, an untreated sapwood board (1″ x 6″ x 6″) was placed flat on the top of the ground, in the center of the treated area, so that termites would have to penetrate or cross the treated soil before they could attack the board. Ten replicates of each treatment were used, in a random block pattern. Treatments are considered to have failed when termites penetrate the treated soil and attack the wood.

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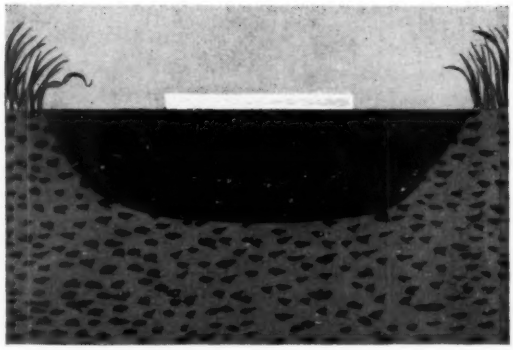
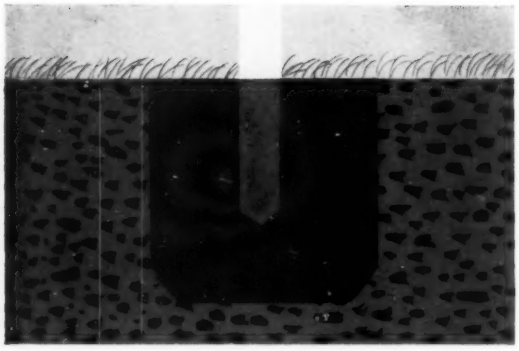


STAKE TEST / ESTABLISHED 1949



Location: USDA Forest Insect Laboratory, Beltsville, Md. Soil: Sassafras Sandy Loam with clay subsoil. Two cubic feet of soil were removed to make a hole 15 inches in diameter and 19 inches deep. As the earth was being replaced in the hole, it was uniformly treated with the poison to be tested, and tamped. A 2″ x 4″ x 18″ untreated sapwood pine stake was driven to a depth of 12″ in the center of the treated soil. Ten replicates of each treatment were used, in a random block pattern. Treatments are considered to have failed when termites penetrate the treated soil and attack the wood.

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2. Chlordane, 1.0% in No. 2 fuel oil or water emulsion
3. Dieldrin, 0.5% in No. 2 fuel oil or water emulsion
4. DDT, 8.0% in No. 2 fuel oil
5. Trichlorobenzene, 25.0% (by volume) in No. 2 fuel oil
6. Sodium arsenite, 10.0% in water

(from RECOMMENDATIONS FOR PROTECTING WOOD IN NEW CONSTRUCTION FROM ATTACK BY SUBTERRANEAN TERMITES, 1957, USDA Forest Service, Division of Forest Insect Research, Forest Insect Laboratory, Beltsville, Maryland).

BENZENE HEXACHLORIDE (TECHNICAL). To be used at a concentration of 0.8% gamma isomer, applied in an oil solution or water emulsion.

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DIELDRIN. To be used at a concentration of 0.5%, applied in oil solutions or water emulsion.

DDT. To be used at a concentration of 8.0% in oil solution.

LINDANE. To be used at a concentration of 0.8% in oil solution or water emulsion.

SODIUM ARSENATE. To be used at a concentration of 10.0%, applied in water.

TRICHLOROBENZENE. To be used at a concentration of one part of trichlorobenzene to three parts oil.

THE TRUTH ABOUT DOSAGES There has been a great deal of comment, in recent years, about the residual effect that various chemicals have when they are used at low dosages for termite control. Two USDA Forest Service Experiment Stations have made recommendations, based on many years of research. These recommendations are a reliable guide to practical minimum dosages. Copies of the reports are available on request.

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COST AND RESULTS Generally speaking, the chemical used is a small part of the cost of any pest control job. We do not recommend basing dosages on cost alone. The proper dosage needed to control termites will vary with soil characteristics, climate, and extent of infestation. A minimum dosage is often false economy in terms of control.

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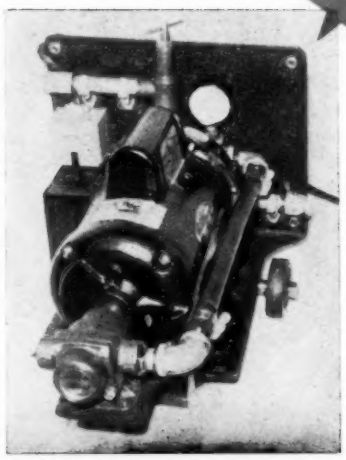

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More Reason Than Ever

Termite control is on the upswing. And this phase of the pest control industry is receiving more attention from the Federal government, contractors, home owners, and the National Pest Control Association.

Certification of soil poisoning is in the foreseeable future. Once realized, this assured protection a home owner can get against termites will be publicized widely.

Certification fees and financing of nation-wide publicity will add some to the operating expenses of doing a termite job properly. These, coupled with increasing labor and material costs, mean there can be no room for irresponsible price cutting.

Price cutting has always been a plague on American business. Fly-by-nights who give a meaningless guarantee and only slipshod service are always a thorn in the side of legitimate, well-financed, properly-manned firms devoted to doing the best possible job. One way to combat this practice is to tell the public through industry-financed publicity what it should demand to assure quality and lasting performance when it buys a product or service. It is conceivable termite control operators might be willing to share in the cost of financing the proper type of publicity campaign even before "certification" gets under way. Legislative licensing is certainly much more expensive to administer, and usually is too cumbersome to stop unlicensed firms quickly.

While the ground is now being laid to bring certification and its accompanying publicity into being, the only intelligent approach is to price realistically in the way you must when the added protection of industry-assured certification becomes a reality. Why cut prices now and then suddenly be forced either to jack them up, or go bankrupt because your prices won't cover the cost of doing a "certified" job?

Soil pre-treatment of concrete slab structures is a recognized effective protection against termites, but a racket in this method of control can spring up if unscrupulous soil-treaters make treatments for less than the cost of the chemicals alone. Don't forget the continuing obligation termite firms have to back up their treatments during the guarantee period: two, five, or eight years.

There's more reason than ever to hold your prices at a profitable level.

The market for termite control will more than double with proper administration and public relations. Protect this potential. Keep public respect by doing creditable work, honestly priced, in a business-like way. Cutting prices now can only invite competitive jack-leg pseudo control firms who ruin the market for every legitimate firm.

1933 OUR SILVER ANNIVERSARY YEAR 1958

PEST CONTROL

EVERY MONTH SINCE 1933

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THEODORE RIEDEBURG, East Coast
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Volume 26 February, 1958 No. 2

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Published Monthly by
TRADE MAGAZINES, INC.
Publication Office: 324 N. State Street, Painesville, Ohio

Please send all correspondence to
Editorial and Advertising Offices: 1900 Euclid Avenue, Cleveland 15, Ohio

Cooperating with
NATIONAL PEST CONTROL ASSOCIATION

New York City Advertising Office
Theodore Riedeburg & Associates
415 Lexington Ave., Phone: MUrray Hill 7-1488

West Coast Advertising Office
The James E. Munford Company
517 North Ave. 64, Los Angeles 42, Calif.,
Phone: CLinton 5-1547

Single Copy Price: 75 cents; Foreign: $1.00. **Subscription Rates:** U. S. and possessions, Canada and members of the Pan American Postal Union, 1 year, $5.00; 2 years, $8.00. All other foreign subscriptions, 1 year $6.00; 2 years, $10.00. **Change of Address:** Three weeks advance notice is necessary for change of address. Both old and new address must be given. Post Office will not forward copies. Entered as Second Class Matter at the Post Office at Painesville, Ohio, under the act of March 3, 1879.

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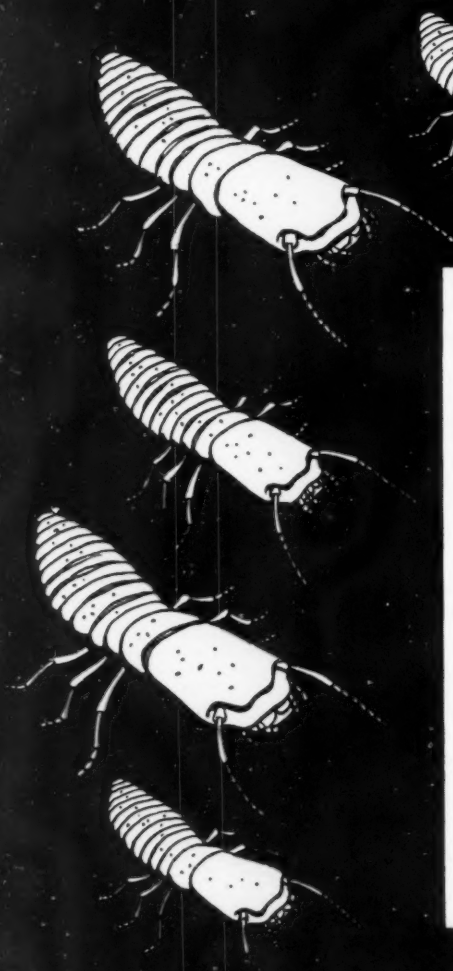

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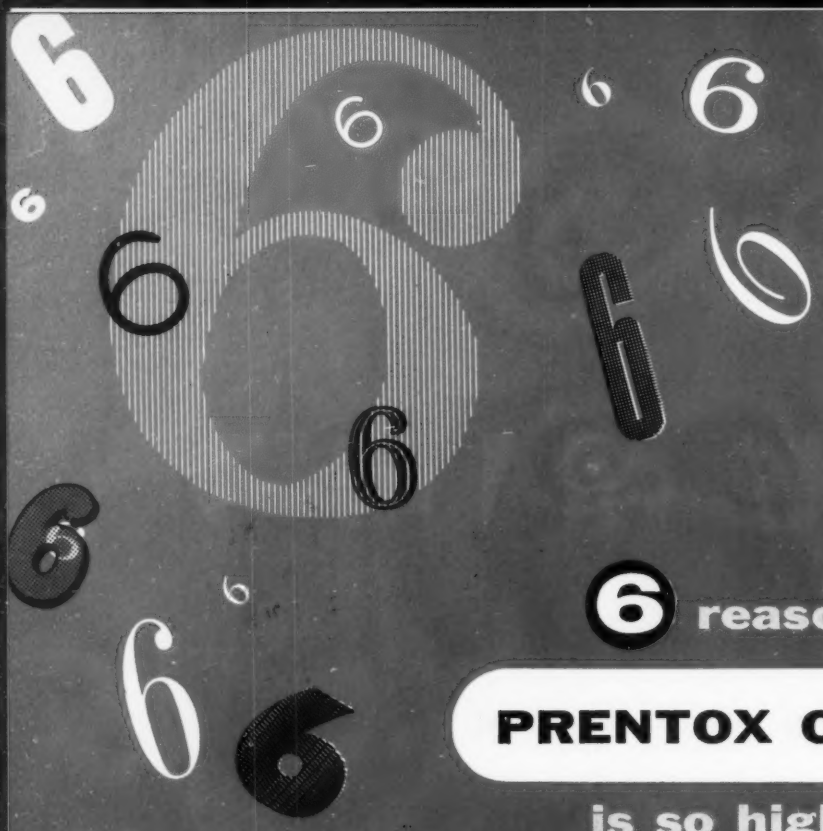

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Fig. 1. Establishing ground-board tests of soil poisons in Mississippi. The chemical is sprinkled on the surface of the soil, and the wooden frame prevents it from running off. After the chemical has soaked into the soil, a sap pine board is placed in the center of the treated area and weighted with a brick.

Written especially for this issue of Pest Control, the following is the U.S. Forest Service's 1958 report on tests in Panama and Mississippi.

Tests with Soil Poisons for Controlling SUBTERRANEAN TERMITES

by H. R. JOHNSTON[1]

Officer in Charge, Forest Insect Laboratory, Southern Forest Experiment Station, U. S. Forest Service
Gulfport, Mississippi

TESTS DURING RECENT years have shown that certain chemicals, when used as soil poisons, will protect buildings from subterranean termites for many years. Chemical treatment of soil before concrete slab floors are poured is particularly valuable because of the high termite hazard in such structures and because remedial measures are difficult and expensive.

Of course, soil poisons can be only a supplement to good construction. Clean, well-drained sites, proper foundations, adequate ventilation, ample clearance, and good architectural design are the first requirements for preventing termite damage to buildings. Pressure-treated wood for foundation timbers may be desirable in areas where the termite population is high. These structural measures will not immunize wooden buildings from attack, however, and where termites are abundant poisoning the soil can provide additional protection.

With even the best chemicals, success depends upon proper use. If the concentrations or dosages are too low, or if "hit-or-miss" applications are made, failures will occur. Improper uses of soil poisons could bring into disrepute the whole idea of soil treatment for termite control.

Soil poisons have been used in the United States for many years, but those generally recommended had various limitations. During recent years the United States Department of Agriculture has intensified the search for better ones. Most of the research is conducted by the Southern Forest Experiment Station's Forest Insect Laboratory at Gulfport, Mississippi. The Laboratory has extensive field installations near Gulfport and lesser ones in other parts of the United States and in the Panama Canal Zone.

This article describes the testing procedures and gives data on the performance of chemicals suggested now or in the past as soil poisons. The article constitutes a progress report, and the list of suggested formulations will be revised if future results justify a change.

Test Methods and Procedures

The first tests reported herein were installed during 1944 on the Harrison Experimental Forest, about 20 miles north of Gulfport They were expanded in 1946, and, at the same time, a series was established in the Panama Canal

[1] Acknowledgment is gratefully made to H. C. Secrest and R. C. Morris, who established many of the tests and collected much of the data reported here.

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Fig. 2.—Establishing a stake test. Soil is removed from a hole 15 inches in diameter and 19 inches deep, treated with chemical, and replaced. A sap pine 2- by 4-inch stake is then driven into the center of the treated soil.

Zone. Many new insecticides have been added since 1946. The Mississippi tests are in a pine-hardwood forest in a light, sandy loam soil with a clay subsoil; the Canal Zone tests are in a jungle with a heavy soil.

In addition, several of the most promising formulations are being tried under buildings damaged by termites. These practical applications were made between 1944 and 1952 in North Carolina on sandy soil.

Following are brief descriptions of the three test methods in use.

1. Ground-board tests (Fig. 1) are designed to determine the most effective formulations and dosages for poisoning the soil prior to pouring concrete slabs. All vegetation is removed from a 17-inch square of soil, and then the chemical is sprinkled evenly over the soil surface. After the chemical has soaked into the soil, a sapwood pine board measuring 1 by 6 by 6 inches is laid flat on top of the ground in the center of the treated area. Termites must cross or penetrate the treated soil before they can attack the board.

2. Stake tests (Figs. 2 and 3) simulate in certain respects the application of soil poisons in trenches around foundations of buildings. Two cubic feet of soil are removed to make a hole 15 inches in diameter and 19 inches deep. After the soil is treated with chemical and replaced in the hole, a 2- by 4- by 18-inch sapwood pine stake is driven to a depth of 12 inches in the center of the treated soil.

3. Building tests are treatments of buildings which have become infested with termites. The chemicals are applied in shallow trenches along the inside and outside of concrete or brick foundations. Most buildings have two or three porches and at least one room with crawl space underneath. Each porch or room is considered as a test unit for inside treatment; i.e., treatments underneath the house and thus partially protected from the weather. The outside treatments are largely around basement entrances, each entrance being regarded as a test unit.

In both the ground-board and the stake tests, ten replications of each chemical treatment are used in a randomized block design. The samples are spaced five feet apart, center to center. Checks are set up in a similar manner, but the soil in the check units is not chemically treated.

In the early tests, the wood boards and stakes rotted out in 1 to 3 years and had to be replaced. Beginning in 1951 and continuing through 1956, all of the wood was given a 3-minute dip in 4.0 percent phenyl mercury oleate in white gasoline; the purpose was to retard decay and reduce the frequency of replacement. Before this chemical was adopted it was tested carefully to see if it affected termites in any way. The conclusion was that phenyl mercury oleate, as used, does not influence termite attack. Subsequent tests have confirmed this conclusion.

The ground-board and stake tests are examined annually. If no attack has occurred on the wood, the treatment is considered effective. Traces of attack (minor surface scoring in small areas) are not counted as failures, because such minor etching occasionally is caused by kings and queens which fly to the stake or board. If the wood has been attacked to a light, medium, or heavy degree (so that the insects definitely have established themselves) and no over-ground route to the wood can be found, a failure is recorded for the treatment. When the wood is definitely attacked, efforts are made to determine how the insects gained access. Many times, their tunnels can be found penetrating treated soil. If such tunnels cannot be found, any debris which covers the treated soil is removed carefully, and a search is made for above-ground passages. Such passages have not been found in any of the tests in Mississippi. A few have been observed in the Canal Zone, but failures were not recorded for the soil treatments.

Significance of Tests

The percent of control or effectiveness obtained by a given treatment is based on the number of the wood samples not attacked by termites. For example, if eight

Fig. 3.—Stake tests of soil poisons in Mississippi. The pine stakes are inspected annually to determine whether termites have attacked them.

Table 1.—Effectiveness of soil poisons in ground board tests in Mississippi and Panama Canal Zone

Formulation (percentages by weight)	Location of test	Year established	Dosage per square ft.	Proportion of ground boards damaged by termites after exposure for									
				1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.
			Pints	Percent									
Aldrin													
In water emulsion													
0.25 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
0.50 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
1.00 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
Benzene hexachloride													
In No. 2 fuel oil													
0.40 percent gamma	Miss.	1948	½	100	100	100	100	90	50				
	Miss.	1948	1	100	100	100	100	100	100	90	90	70	
0.50 percent gamma	C. Z.	1951	1	100	70	50							
	C. Z.	1951	2	90	90	60	40						
0.80 percent gamma	Miss.	1948	1	100	100	100	100	100	100	100	90	90	
In water emulsion													
0.40 percent gamma	Miss.	1948	½	100	100	80	70	70	60	60	60	20	
	Miss.	1948	1	100	100	100	100	100	100	80	80	80	
	C. Z.	1951	3	90	90	80	50						
0.80 percent gamma	Miss.	1948	1	100	100	100	100	100	100	100	100	90	
Chlordane													
In No. 2 fuel oil													
1.00 percent	Miss.	1948	½	100	100	100	100	100	100	100	100	100	
	Miss.	1948	1	100	100	100	100	100	100	100	100	100	
2.00 percent	Miss.	1948	½	100	100	100	100	100	100	100	100	100	
	Miss.	1948	1	100	100	100	100	100	100	100	100	100	
	C. Z.	1951	2	100	90	90	90	70					
In water emulsion													
2.00 percent	Miss.	1948	½	100	100	100	100	100	100	100	100	100	
	Miss.	1948	1	100	100	100	100	100	100	100	100	100	
	C. Z.	1951	2	100	70	50	30						
	C. Z.	1951	3	100	100	70	70	70					
Coal tar creosote													
In No. 2 fuel oil													
50.00 percent (vol.)	Miss.	1948	1	90	50								
In kerosene													
25.00 percent (vol.)	C. Z.	1946	2	80	30								
DDT													
In No. 2 fuel oil													
5.00 percent	Miss.	1946	½	100	100	100	70	50					
	Miss.	1946	1	100	100	100	100	80	80	80	80	80	80
	C. Z.	1951	1	90	80	60	50						
	C. Z.	1951	2	100	90	70	50						
In water emulsion													
5.00 percent	Miss.	1951	½	90	60	30							
	C. Z.	1951	2	100	70	40							
Dieldrin													
In No. 2 fuel oil													
0.50 percent	C. Z.	1953	1	100	100	100	100						
	C. Z.	1953	2	100	100	100	100						
1.00 percent	C. Z.	1953	1	100	80	80	80						
	C. Z.	1953	2	100	90	90	90						
2.00 percent	C. Z.	1953	1	100	80	80	80						
	C. Z.	1953	2	100	70	70	70						
In water emulsion													
0.25 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
0.50 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
1.00 percent	Miss.	1949	1	100	100	100	100	100	100	100	100		
	C. Z.	1953	2	100	70	70	70						
	C. Z.	1953	3	100	80	80	80						
2.00 percent	C. Z.	1953	2	100	90	90	90						
	C. Z.	1953	3	100	70	70	70						
Heptachlor													
In water emulsion													
1.00 percent	Miss.	1952	½	100	100	100	100	100					
2.00 percent	Miss.	1952	½	100	100	100	100	100					
5.00 percent	Miss.	1952	½	100	100	100	100	100					
Pentachlorophenol													
In No. 2 fuel oil													
5.00 percent	Miss.	1951	1	100	100	50							
	C. Z.	1951	1	90	10								
	C. Z.	1951	2	80	10								
Sodium arsenite													
In water													
10.00 percent	Miss.	1946	½	100	100	100	80	40					
	Miss.	1946	1	100	100	100	85	55	55				
	C. Z.	1946	1	100	100			100	95	45			
	C. Z.	1946	2	100	100			100	100	75	35		
Controls													
No. 2 fuel oil	Miss.	1948	1	100	80	30							
	C. Z.	1946	1	75	25								
Untreated	Miss.	1946		20									
	C. Z.	1946		50									

of the ten samples in a treatment are unattacked, the treatment is considered 80% effective — or 80% control is obtained. Stated in negative terms, two test units, or 20%, failed to prevent termite attack. The percent of failure definitely is **not** to be construed as meaning that 20% of the termites present in the test area were able to attack all of the 10 samples of wood in the treated soil.

In the building tests, a treatment is considered to have failed when termites penetrate the treated soil and construct tubes over the foundations. Here, 80% control would mean that two retreatments would be necessary for every 10 buildings treated.

Termites penetrate soil through holes or passageways which they construct. In laboratory tests, where activity of insects can be seen through glass, it has been observed that penetration of resistant materials is gradual; months may elapse during the construction of a single hole through resistant material about three-fourths inch thick. This gradual type of penetration probably occurs with soil poisons, and many individual termites may be sacrificed without affecting seriously the population of the colony. If penetration of treated soil is, in reality, gradual, it would seem that these field tests are more reliable than laboratory tests, since in the field the insects are working under natural conditions with an almost unlimited supply of individuals that can bide their time in penetrating the treated soil.

Results

The field installations, being fully exposed to the weather, are more severe trials than the building tests. In general, the formulations and dosages which are effective in either the groundboard or stake tests can be relied upon to give a high degree of protection to buildings. Several formulations which gave poor results in the field tests offered good protection underneath buildings.

Main results are summarized in tables 1, 2, and 3. In evaluating these data, it was considered that only formulations giving good results for at least 5 years in one or both types of field tests in Mississippi can be safely recommended for use in the United States. The following formulations (arranged in alpha-

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Table 2.—Effectiveness of soil poisons in stake tests in Mississippi and Panama Canal Zone

Formulation (Percentages by weight)	Location of test	Year established	Dosage per 10 cu. ft. of soil	Proportion of stakes undamaged by termites after exposure for												
				1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.
Aldrin			Gallons						Percent							
In water emulsion																
0.50 percent	Miss.	1952	3-¾	100	100	100	100	100								
1.00 percent	Miss.	1952	3-¾	100	100	100	100	100								
Benzene hexachloride																
In kerosene																
0.20 percent gamma	Miss.	1948	2-½	100	100	100	90	50								
0.40 percent gamma	Miss.	1948	2-½	100	100	100	100	90	60	60	40					
0.80 percent gamma	Miss.	1946	2-½	100	100	100	100	100	100	100	100	90	80	70		
	C. Z.	1946	2-½	100	100	—	—	—	0							
In No. 2 fuel oil																
0.50 percent gamma	C. Z.	1952	5	100	100	100	100	100								
In water emulsion																
0.40 percent gamma	Miss.	1952	2-½	100	100	100	100	100								
	C. Z.	1952	5	100	100	90	90	90								
0.80 percent gamma	Miss.	1952	3-¾	100	100	100	100	100								
Chlordane																
In No. 2 fuel oil																
2.00 percent	Miss.	1951	4	100	100	100	100	100	100							
	C. Z.	1952	7-½	100	100	100	100	100								
In water emulsion																
0.50 percent	Miss.	1952	3-¾	100	90	90	90	90								
1.00 percent	Miss.	1952	3-¾	100	100	100	100	100								
2.00 percent	Miss.	1951	4	100	100	100	100	100	100							
	C. Z.	1952	7-½	100	100	90	90	90								
Coal tar creosote																
In kerosene																
50.00 percent (vol.)	Miss.	1948	3-¾	100	80	60	50									
DDT																
In No. 2 fuel oil																
2.00 percent	Miss.	1944	2-½	100	100	100	100	60	30							
4.00 percent	Miss.	1944	2-½	100	100	100	100	90	90	70	70	60	50	30		
5.00 percent	C. Z.	1952	5	100	100	100	100	100								
8.00 percent	Miss.	1944	2-½	100	100	100	100	100	90	90	90	90	90	90	70	60
In water emulsion																
5.00 percent	Miss.	1952	3-¾	90	80	80	80	80								
	C. Z.	1952	5	100	90	80	80	80								
Dieldrin																
In No. 2 fuel oil																
0.50 percent	C. Z.	1953	5	100	100	100	100									
1.00 percent	C. Z.	1953	5	100	100	100	100									
2.00 percent	C. Z.	1953	5	100	100	100	100									
In water emulsion																
1.00 percent	Miss.	1952	3-¾	100	100	100	100	100								
	C. Z.	1953	7-½	100	100	100	100									
2.00 percent	Miss.	1952	3-¾	100	100	100	100	100								
	C. Z.	1953	7-½	100	90	90	90									
Heptachlor																
In water emulsion																
5.00 percent	Miss.	1952	3-¾	100	100	100	100	100								
Pentachlorophenol																
In No. 2 fuel oil																
5.00 percent	Miss.	1949	4	100	100	100	80	60	50							
	Miss.	1949	6-¼	100	90	90	90	80	70	70	50					
6.00 percent	Miss.	1949	4	100	90	70	50	40								
Sodium arsenite																
In water																
10.00 percent	Miss.	1948	3-¾	100	100	100	100	100	100	100	100	80				
Trichlorobenzene																
In No. 2 fuel oil																
25.00 percent (vol.)	Miss.	1948	3-¾	100	100	100	100	90	80	70	60	50				
	C. Z.	1952	5	100	100	100	80	70								
In water emulsion																
25.00 percent (vol.)	Miss.	1948	3-¾	100	100	100	80	80	70	60	50	40				
Controls																
No. 2 fuel oil	Miss.	1948	3-¾	100	90	80	60	50								
	C. Z.	1952	7-½	100	100	30	60	40								
Kerosene	Miss.	1948	3-¾	100	80	40										
	C. Z.	1948	5	20	0											
Untreated	Miss.	1948		20	10											
	C. Z.	1948		50	0											

betical order) are among the best tested thus far, and are suggested for practical use to protect buildings.

Aldrin, 0.5% in No. 2 fuel oil or water emulsion.
Benzene hexachloride, 0.8% gamma in No. 2 fuel oil or water emulsion.
Chlordane, 1.0% in No. 2 fuel oil or water emulsion.
DDT, 8.0% in No. 2 fuel oil.
Dieldrin, 0.5% in No. 2 fuel oil or water emulsion.
Heptachlor, 1.0% in No. 2 fuel oil or water emulsion.
Sodium arsenite, 10.0% in water.
Trichlorobenzene, 25.0% (by volume) in No. 2 fuel oil.

A dosage of 1 to 1-½ gallons of any of the emulsions or of the water solution of sodium arsenite per 10 square feet of surface area is recommended for over-all treatment before pouring concrete slabs. Four gallons per 10 cubic feet of soil should be used for treating around foundations.

Aldrin and heptachlor have not been tested as extensively as have most of the other chemicals suggested for use, but enough data have been obtained to indicate that they are promising soil poisons. Neither of these chemicals has been tested in oil, but, judging from the performance of the other chlorinated hydrocarbons in oil, it is probable that they will be as effective in oil as in water emulsion.

The tests have not been in progress long enough to show the relative effectiveness of some of the formulations. The suggestions are based on over-all performance to date in these tests, irrespective of the cost of the formulation. Since the chemical usually is only a small portion of the cost of treating a building, it appears logical to use enough chemical to prevent attack for a long period. The concentrations and dosages suggested provide an equitable margin of safety for all chemicals. Tests have not been conducted in a wide variety of soil types, but probably the suggested concentrations and dosages will serve for most U. S. soils.

Tables 1 and 2 show that much heavier dosages and concentrations are necessary in the Canal Zone than in Mississippi. The dosages or concentrations suggested for the United States probably should be doubled in the tropics.

Chemicals which gave 50% or less protection for five years (when tested at practical concentrations and rates of applica-

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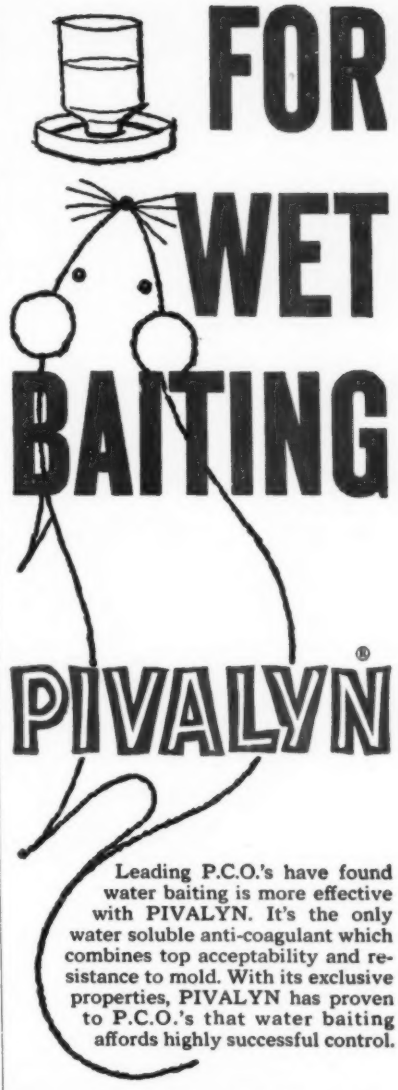

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Table 3.—Effectiveness of soil poisons in controlling termites in buildings

Formulation	Year established	Dosage per 10 lineal ft	Underneath buildings		Outside of buildings		Total	
			Units treated	Undamaged	Units treated	Undamaged	Units treated	Undamaged
		Gallons	Number	Percent	Number	Percent	Number	Percent
Coal-tar creosote								
In No. 2 fuel oil								
50.0 percent	1944-45	2	19	95	8	63	27	85
Chlorinated toluene (2-chloro-6-nitro-toluene)								
In No. 2 fuel oil								
25.0 percent	1944-45	2	21	100	7	57	28	89
DDT								
In No. 2 fuel oil								
5.0 percent	1945-46	4	59	97	28	75	87	90
10.0 percent	1945-46	4	22	100	7	57	29	90
In water emulsion								
5.0 percent	1946	4	39	97	4	50	43	93
Orthodichlorobenzene								
In No. 2 fuel oil								
25.0 percent	1944-45	2	86	92	19	37	105	82
	1945	4	6	100	2	0	8	75
Pentachlorophenol								
In No. 2 fuel oil								
5.0 percent	1945-48	4	28	93	25	60	53	77
Sodium arsenite								
In water								
10.0 percent	1944-45	2	40	100	0	...	40	100

tion) are considered inferior to those suggested for use. These include acetylene tetrachloride, chlorinated nitrotoluene, copper ammonium fluoride, copper naphthenate, copper sulphate, coal-tar creosote, coal-tar creosote plus orthodichlorobenzene, hexachloroethane, lead arsenate, methoxychlor, monochloronaphthalene, orthodichlorobenzene, pentachlorophenol, sodium dinitro-orthocreosolate, and zanthane.

Practical Application of Soil Poisons

Since there are many variations in construction, a detailed discussion of preventive and remedial treatments is impossible.

The essential thing is to apply the insecticide in such a way that it forms a barrier to termite entry.

Preventive measures.—Slab-on-ground construction is very susceptible to termite attack, and remedial measures are difficult and expensive. Therefore, prevention is highly desirable. Protection can be secured for many years by poisoning the soil before the slab is poured.

Treatment should be made after all filling and grading is complete. Critical areas, such as along foundation walls and around plumbing, should be treated by the trenching method described later under remedial measures. In addition, an over-all surface treatment at a dosage of not less than 1 gallon per 10 square feet is recommended if the fill is soil or unwashed gravel. If cinders, washed gravel, or similar coarse material is used in the fill, the dosage should be increased by at least one-half.

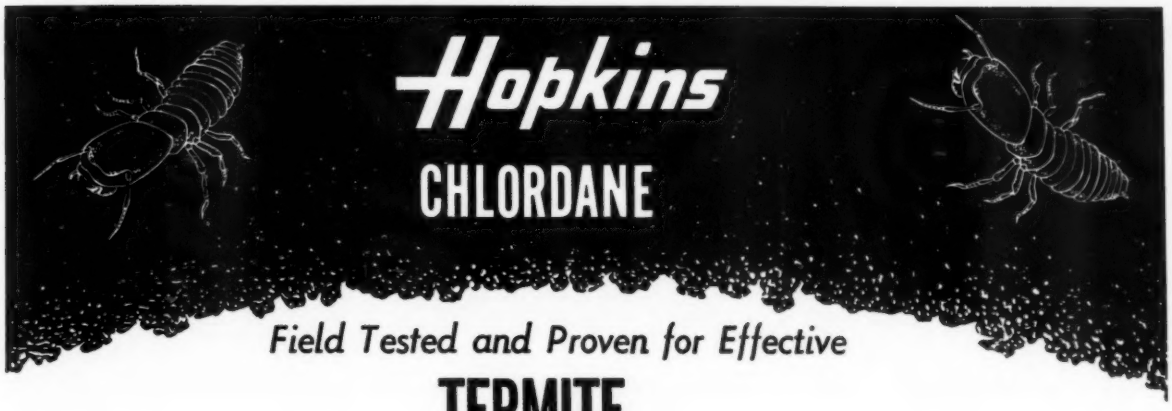
Voids in hollow-block foundations should be treated with at least 2 gallons per 10 linear feet of wall. For buildings having crawl space or basements, the trench and void treatments can be used as preventive measures without an over-all surface application.

Remedial measures. — In remedial treatment, slab-on-ground construction presents the most serious problems, because it is difficult to get the poisons where they will be effective. One method of treating is to drill holes through the concrete slab at any point where termites may enter. The holes should be spaced about a foot apart to insure proper treatment of the soil underneath. Another method is to drill through the foundation walls from the outside and force the chemical just underneath the slab along the inside of the foundation and along expansion joints. Any one of the formulations listed above should be applied at the rate of 4 gallons per 10 linear feet of foundation or expansion joint.

To treat buildings having crawl space or basements, dig a trench adjacent to and around all piers and pipes and along the sides of foundation walls. A trench 6 to 8 inches deep and about the same width is ample for solid concrete foundations which have not developed cracks. While the trench is open, one of the previously mentioned formulations should be poured in at a rate of 2 gallons per 10 linear feet of trench. Then, as the excavated soil is put back into the trench, it also should be treated at the rate of 2 gallons per 10 linear feet. This rate of application is equal to about 4 gallons per 10 cubic feet of soil, assuming that the chemical spreads downward and outward from the trench. For brick, hollow block, and concrete foundations that have cracked, care should be taken to dig the trench to the footing. This is a precaution to prevent termites from gaining hidden entry through voids in these types of foundations. The amount of chemical applied in deep trenches should be increased correspondingly. Voids in hollow-block foundations should be treated as described under preventive measures.

Warning!

All of these chemicals are poisonous if taken internally, and some of them can be absorbed through the skin. If they are spilled on the body, they should be washed off immediately with warm, soapy water. Sodium arsenite is very toxic to plants and should not be used where the roots of valuable plants will contact it. The oil solutions will damage plants if applied to their roots.



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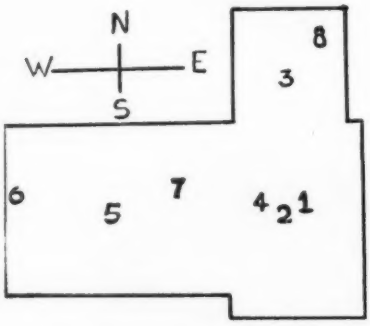
Fumigation of Hawaii's Makiki Church for Termites

This job, handled by Honolulu TO "Ernie" Forde, was complicated by structural considerations, chief of which was the pagoda tower, shown right under wraps shortly before the methyl bromide was introduced.

SUCCESSFUL fumigation of Honolulu, Hawaii's Makiki Christian Church with its boxy, pagoda-like, Oriental styling represents a real triumph for termite operator E. L. "Ernie" Forde, boss of Honolulu's Fumiseal Company. Confronted by a heavy infestation of drywood termites (Cryptotermes), church officials summoned fumigator Forde last June to treat their 26-year-old, 432,000 cubic foot temple: a cluttered combination of gables topped by a three-level tower that juts out of the church's main lobby and rises 92 feet above the ground. The job took three days from start to finish.

Eight points of infestation were detected by Fumiseal inspectors. Tubes were found 75 feet off the ground in the top tower; 45 feet from the ground in the stairway of the second floor tower; 30 feet high in the attic of the north wing; 20 feet high in the west wing of the second floor; five feet high in the central downstairs portion of the church; three feet from the ground, on both the west door of the first floor and on an office railing; and under



Points of infestation. This diagram shows the eight locations in Honolulu's Makiki Christian Church where termite activity was evident when premises were checked by E. L. Forde's Fumiseal inspectors. Point No. 1 was in the top tower 75 feet above ground level; No. 2 was in the second floor tower 45 feet above the ground; No. 3 was in the attic of the north wing, 30 feet up; No. 4, center downstairs, 5 feet above the ground; No. 5, second floor west wing, 20 feet high; No. 6, first floor, west wing, 3 feet high; No. 7, downstairs office railing, 3 feet up; and No. 8, north wing downstairs, ½ foot above ground level. Complete operation took 3 days.

the floor of the north wing, six inches above ground level.

"Forty 8-ounce red and white and other colored nylon vinyl-coated tarpaulins from Minx Products were used to cover the top of the tower and auditoriums of the church," Forde says. "Additionally, 6 mil. polyethylene film was used to cover two sections of the church's tower."

Crane for "Tents"

To hoist the necessary plastic and canvas tents to the roof of the church auditorium, Fumiseal superintendent Eugene Yamane, who directed covering and uncovering operations, kept a crane with a 95-foot boom busy for six hours. Once covers were atop the church, Fumiseal's Joseph Limbago rode a cement bucket suspended from a cable at the end of the crane in order to clamp tents on the tower. In all, 20,000 1-inch and 2-inch Hargrave clips were used to attach tents to each other. Covering material was secured by 5,000 feet of ¾-inch manila rope and 900 feet of used fire hose. Three hundred sand bag snakes and ten yards of sand were used to hold the bottom of the tent.

Sharp corners of eaves demanded special attention. Many roofs of buildings in Hawaii are constructed of galvanized iron. These roofs have razor sharp edges that will puncture and shred a tarpaulin if no precautions are taken when there is any wind. To avert such an occurrence, corners of church eaves were wrapped in carpet scraps and furniture covers. Forde's crew also was aided, in this respect, by favorable weather. Trade winds, which frequently reach 40 miles an hour or more in velocity, were gentle during the entire three-day operation, and the temperature averaged a mild 78 degrees.

"This job of covering was huge," Forde recalls. "It took two 12-hour shifts of five men each, plus a superintendent, to cover the building. This added up to over 120 manhours."

MB Cylinders Downstairs

To speed-up application of the gas throughout the ground floor, ten 50-pound cylinders of Dow methyl bromide were applied cold by gas-masked fumigators who opened the cylinders. Five first class licensed fumigators were used on the job, as well as a number of second class operators.

In addition, another 500 pounds was applied by hoses to the top or attic of the tower. To give the fumigant better dispersion, it was heated by three evaporating heaters. Total gas for the 432,000 cubic foot church was introduced in less than a half hour, according to Forde.

Mechanical movement of the fumigant was maintained throughout the job by use of fans blowing up the tower. These were stationed about half way up it. Another squirrel cage blower was installed on the ground floor, and a large gasoline powered blower, outside the building.

The gasoline blower was connected to two flex tube trunks, which pulled the gas from the bottom of the church and transferred it to the top of the tower through a 6-inch polyethylene tube. This assured adequate quantities of gas in the high tower of the church for the necessary length of time. Blowers on the first floor were turned on five hours after the gas was introduced into the building.

Gow Mac readings, based on ounces of methyl bromide per

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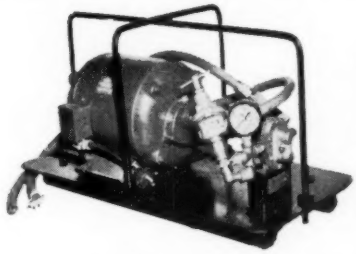

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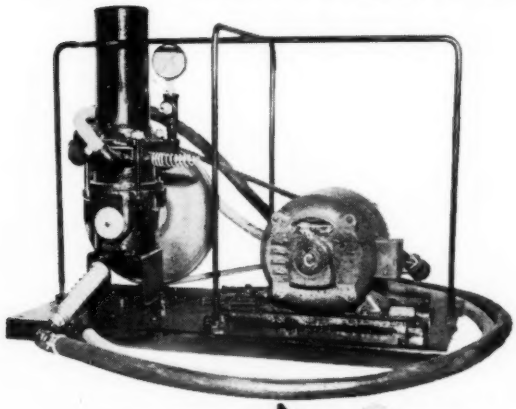

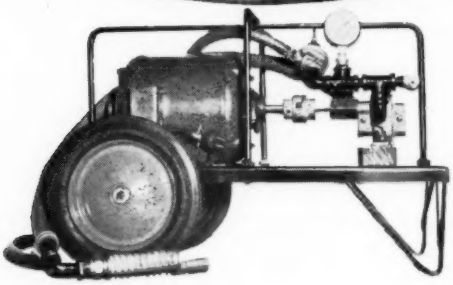

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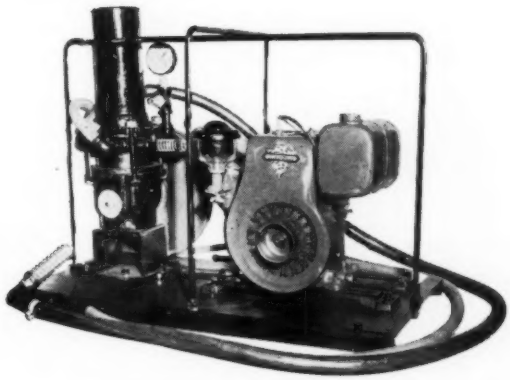

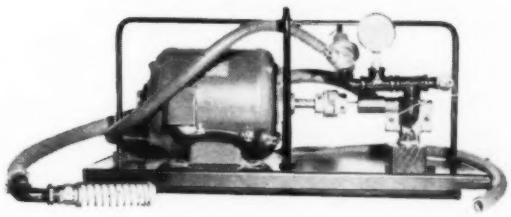

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Perfect for use in any commercial, industrial, institutional or residential building. SANI-AIR banishes all disagreeable odors, continuously and positively. No other method works so effectively at so little cost. SANI-AIR refills —the finest on the market—are available in many highly pleasing scents.

The SANI-AIR Electric Deodorizer is guaranteed for one year, but actual experience shows there is less than ½ of 1% failure in five years continuous operation.

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ASSOCIATED PRODUCTS, INC.
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Gow-Mac Readings During Fumigation of Makiki Christian Church, Honolulu

(Ounces of Methyl Bromide per 1,000 cubic feet)

Tube Locations	Height Above Ground	8 PM	9 PM	10 PM	11 PM	Mid.	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM
1. Top Tower	75′	20	22	14	12	18	20	18	16	12	14	14	14
2. 2nd Floor Tower	45′	12	14	14	13	17	18	16	20	18	20	18	16
3. Attic, North Wing	30′	9	15	13	13	20	18	16	20	18	20	16	16
4. Center, Downstairs	5′	100	100	100	75	26	24	18	26	22	30	24	14
5. 2nd Floor, West Wing	20′	12	12	10	10	14	13	14	16	12	22	20	18
6. 1st Floor, West Wing	3′	40	34	30	30	36	32	30	28	28	30	26	24
7. Downstairs Office Railing	3′	52	52	48	30	22	22	26	26	28	28	20	14
8. North Wing, Downstairs	½′	100	92	89	60	45	46	40	34	32	34	29	26

Gas introduced 6 PM, June 4, 1957. No wind. Estimated temperature: 6 PM 81°; 12 midnight 74°; 6 AM 71°.

1,000 cubic feet of space, were made regularly throughout the 14-hour fumigation period at the eight points of known infestation. The gas was introduced at 6 o'clock one evening, and the first reading was obtained two hours later, with successive readings following hourly.

Highest concentration of methyl bromide two hours after initial application was in the central and north wing areas downstairs, where the 50-pound cylinders of MB were used. Both of these points registered 100 ounces per 1,000 cubic feet, compared with 52 ounces on the infested office railing downstairs; 40 ounces near the west door of the first floor; 20 ounces in the top tower; 12 ounces in the stairway of the second floor tower and the second floor west wing; and 9 ounces in the north attic.

The accompanying chart shows the concentration of fumigant in ounces of methyl bromide per 1,000 cubic feet, as determined by a Gow-Mac Gas Master.

Following completion of the fumigation, it took Fumiseal 60 manhours to uncover the church. Only mishap occurred when a piece of concrete the size of a 25-cent piece was chipped out of a step by one of the gas tanks. This was immediately repaired by a masonry contractor.

Logistics represent a major problem to Hawaiian fumigators since sources of gas, clips, tarpaulins, and other equipment are at least 2,500 miles away. Additionally, work is done on all five of the major islands, which necessitates the moving of trucks and equipment by barge, and crews by plane.

"Our company has done work in every section of every island," Forde says. "This has been with cattle ranchers, sugar plantation owners, pineapple growers, and fishermen. Crews are frequently away from Honolulu for weeks at a time not only treating houses for drywood termites, but also covering and fumigating pineapple fields for weed control. Tight schedules must be met in order to coincide with barge and plane transportation.

"While the work is very hard, the average weight of the Fumiseal crew member is not over 135 pounds. Strong, but light men are preferred to heavy men on Hawaiian roofs."

Fumiseal owner Forde has been operating in the Hawaiian Islands for 19 years. He is a member of the NPCA Fumigation Committee.

PESTMASTER*

methyl bromide

cuts fumigation costs

50%

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PESTMASTER* Methyl Bromide is a highly versatile fumigant for use in other types of fumigation.

As a space fumigant for factories, warehouses and mills it controls insects in all life stages with low rates of application.

Pestmaster's high toxicity and great penetrating power has made it a favorite for quarantine and transit fumigations. It is equally effective for fumigation of certain living plants, especially nursery stock, in the dormant stage.

For house fumigation Pestmaster kills rodents, vermin and insects and is unusually effective on termites and powder post beetles. It is not corrosive and can be used in any building that can be sealed.

Send in the coupon below to get more information on the use of this remarkable fumigant which can cut your operating costs and make more profit for you.

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903 PRO*—Chemical Duster

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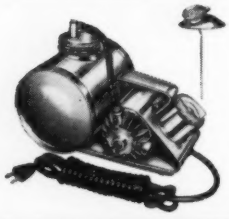
276S—Seal-Tight* Sprayer

4 gallon capacity, corrosion-resistant stainless steel tank, with exclusive Seal-tight locking cover and electrically welded seams. Easy stroking 1¾" x 15½" seamless brass pump. 42" oil and chemical-resistant hose, rotatable shut-off, 24" brass extension with exclusive Revolvo* nozzle that turns full circle.

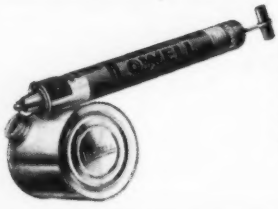
77SA—Napsak* Sprayer

5 gallon stainless steel sprayer with a positive piston stainless steel pump developing pressures up to 100 lbs. Tank back has double wall for greater comfort. Dasher agitator keeps solution well mixed. Use with any spray material. Pump handle can be mounted right or left. 5 ft. hose, fully rotatable shut-off, 24" brass extension with exclusive Revolvo* nozzle.



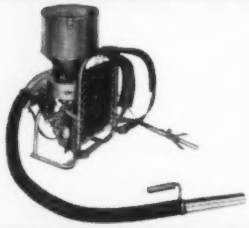
304—Thoro-Spray* Electric Sprayer

3 qt. stainless steel tank, automatic time switch, dual purpose nozzle for residual or atomized mist spray. Includes extra 4-jet Atomist* spray head for greater kill of flying insects. Will handle any liquid insecticide, disinfectant or deodorant. Discharges about 1 oz. per minute.



231—Continuous Sprayer

A general purpose continuous sprayer with new "Adjusto" nozzle for fog or coarse spray. Patented Nu-Power pump, 1½" x 13", 1 qt. heavy tinplate container. Double seamed and leakproof. 1¼" opening for easy filling. Especially recommended for resale.



4601—Nap-Sak* Power Duster

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63030—Spraycat* Power Sprayer

30 gallon tank with single piston pump that has new spring-loaded poppet valve with nylon discs and seats, extremely tough, almost wearproof against agricultural chemicals. New Jet-O-Matic* agitation. Handles all sprayable solutions. Available, gasoline or electric powered models. Rolls easily on pneumatic tires. Other models from 15 to 150 gal. capacity.

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Over fifty years manufacturing experience makes Root-Lowell a real "Pro" in the sprayer and duster field. Write today for our Catalog #90 published exclusively for the Pest Control Operator, featuring PRO* sprayers and other selected, market-tested Root-Lowell sprayers and dusters best suited to the professional operator for both use and re-sale purposes.

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Research Assistant Joseph Kehn of Purdue University, Lafayette, Ind., introduces ethylene dibromide beneath pseudo-slabs to determine the movement of the fumigant through the soil.

factors affecting sub-slab fumigant dispersion in soil

By **DR. JOHN V. OSMUN**

Head, Department of Entomology, Purdue University

THE INCONSISTENT results in subterranean termite control that have accompanied the use of fumigants applied beneath concrete slabs throughout the nation require that we re-evaluate the use of this control method. Examine the extremes that are represented in these examples:

Early one morning last spring, a family in northern Indiana literally crawled out of bed, picked up the unconscious dog and barely made it out into the safety of fresh air. Their home had received a sub-slab fumigation treatment for termites the day before. The fumigant had worked its way into a heating system beneath the slab and from there into the house—a factor that had not been taken into consideration at the time of application.

About the same time, one hundred miles south of there, a fumigant application was made beneath a slab laid directly on the native earth without gravel fill. The charge was introduced less than one foot from a termite infested wall. Two weeks later the termite colony was still thriving.

Out in Los Angeles, an operator introduced his fumigant and killed a colony 15 feet away. At almost anytime in certain areas of California, a good operator can expect penetration a considerable number of feet away in soil beneath slab homes.

In each of these three cases, different conditions prevailed; conceivably all three could have occurred in the same residential block. The first represents a hazard; the second, soil conditions that prevent fumigant dispersion; and the third soil conditions conducive to good gas movement and control.

The problem of evaluating hazards is entirely the responsibility of the man applying the gas; suffice to say here, dangerous situations must always be anticipated! The soil conditions that can occur beneath slabs, however, need also to be understood. Much research work continues to be required along this line, but helpful information is already available to aid us in judging the wisdom of applying fumigants in sub-slab fumigation. Consider the following when you decide on your chemical and the spacing required for its introduction.

It is not the intention of this article to present research data other than to illustrate various points. Numerous papers are available on fumigants in soils, especially as they relate to nematode control. The research now in progress at Purdue University on fumigants beneath slabs will be published when completed. The intent here is to give an indication of the factors that can play an important part in the success or failure of sub-slab fumigation on **each particular application** — a point that should be remembered since different conditions usually prevail in each building, even in one geographical area.

Influence of Soil Types

Soils vary greatly in their composition from gravel to tight clays. Providing there is little or no organic matter present, fumigants should move most rapidly in the coarse gravel where there is less surface for sorption of the fumigant and a greater interspace between particles (porosity) through which the gas can move. This opportunity for movement becomes less and less as the soil type changes towards other soil types until movement may be quite restricted in clay soils composed of fine particles. Such soils have a tremendous amount of actual surface on which to absorb chemicals, and their structure may be such that once absorbed, they will hold it tightly. In addition, the more compact the soil, the less opportunity there is for movement between the particles. Almost all types of soil could conceivably be found beneath different slabs. In situations where a gravel fill is known to occur directly beneath a slab, the opportunity for movement is excellent and once the gas has moved laterally, some downward movement can be expected. Where the gravel fill is lacking, movement from the point of entry will be little. This is borne out by the preliminary results at Purdue where the maximum movement in silt loam resulting in insect mor-

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tality was 6 inches as compared with a movement in gravel of 24 inches. Traces of gas were noted at 2 feet and 13 feet respectively, but not at concentrations high enough to be useful.

Organic Content of Soil

The organic content of soils, which can vary greatly, will alter any previously made assumptions about movement in various soil types. With increasing organic matter, stronger sorption and perhaps increased rate of decomposition occurs. This means that movement of gas in soils with high organic matter content is greatly restricted. The most extreme situation of this sort is found in peat or muck soils.

Moisture Content of Soil

Moisture content of the soil, in the case of ethylene dibromide at least, is probably more important than the soil type itself. Let us think of moisture as a competitor to the fumigant. It works for and depending on relative water content. A small amount will show against the movement of the gas preferential adhesion on the surface of soil particles, thus occupying part of the surface at least that a fumigant might occupy. Such a situation will permit greater movement of gas. A larger degree of moisture, however, will act to tie up EDB to some extent since this chemical is soluble in water in the amount of 250 p.p.m. The result will be a restriction of movement and a higher level of gas will be concentrated in a small area near the point of introduction. A very wet soil will obviously block movement almost entirely, since the interspaces normally available to the gas are already filled.

Air Affects Gas Retention

The greatest factor governing the loss of gas from the soil is air. In open field applications, the loss can be quite rapid. Beneath a slab, however, there could well be quite a residual providing the slab is tight and air movement in the soil is virtually non-existent. The residual possibilities that exist in subslab fumigation favor the use of a slow volatilizing chemical such as ethylene dibromide. With extensive air movement, a gas with a high vapor pressure may well be lost before lethal concentrations are achieved in the area or held long enough in spots where termites are present.

When a fumigant is released beneath a slab, the chemical attempts to come into equilibrium with the air, solids and liquids present in the soil. The extent of movement or retention of the fumigant is governed by an interaction of the above and certain other factors. No real prediction of results can be made unless a great deal is known about

(Continued on page 56)

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WOOD-DESTROYING ORGANISMS

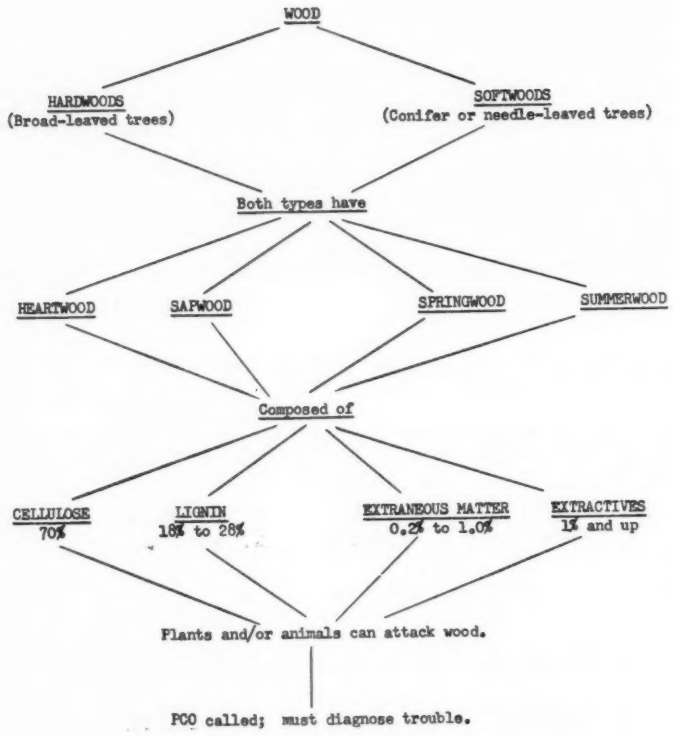
- **Composition and Structure of Wood**
- **Recognition of Organisms-Control Methods and Materials**
- **Application of Knowledge Covering Control Procedure**

PART ONE:

Composition and Structure of Wood

by IRA HATFIELD

Director of Research
Wood Treating Chemicals Co.
St. Louis, Missouri



WOOD IS ONE of the most universally used building materials. It is either used in the form of logs or cut into timbers or boards, or is re-manufactured into different types of composition material. It is almost impossible to find a building that does not contain wood in some form, whether that form is as flooring, partitions, roof supports, or in the form of an entire wood house commonly known as a frame house. That is because lumber and wood products are among the most economical materials available to home builders. This economy of wood is not limited to small frame houses, but extends to higher priced houses where wood can really demonstrate its architectural features combined with its beauty.

It is not the beauty or the shape or size of the wood that is important to the commercial pest control operator (PCO), but rather its composition and conditions of use or misuse. Being organic in nature, it can be utilized as a source of food by organisms unless it is properly used. As indicated, misuse often gets the building and its owner into difficulties, and it is, therefore, important that the PCO know something about wood and its use if he is to help a potential client who seeks counsel and service when the wood or wood products in his home or other buildings are giving him trouble. Likewise, if the PCO has the knowledge, he can also act as a counselor to those who might otherwise utilize wood in a way that would subject it to attack by decay, termites, or other wood destroying organisms.

Structure, Composition of Wood

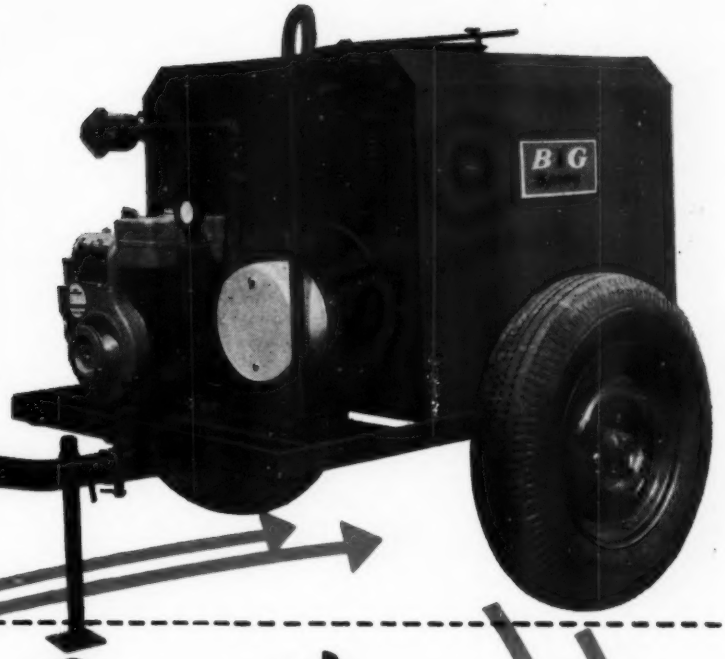
First, let us get familiar with wood. We all can differentiate between it and concrete or plastics or metal, for instance, but that is not enough. Just as it helps you select drills to know about the composition of masonry

B&G

Breaks Through the Pressure Barrier

FOR THE

TERMITE CONTROL OPERATOR



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IT'S FOOL PROOF! Lubricated for Life; Easily Disassembled.

IT'S LOW COST! About Half of Anything Remotely Similar.

IT'S ADJUSTABLE! From 0 to 500 lbs. pressure.

IT DELIVERS MORE! 10 Gallons a Minute.

4 CYLINDERS FOR FAST EVEN FLOW
CERAMIC CYLINDERS DEFY WEAR
DUST AND DIRT SEALED OUT.

There's nothing even closely similar to B&G's "Big Spray!" Now you'll have perfect pressure for any application: insecticides on soil, injection under slabs, treatment of voids and piers. And you can haul it with a Rambler!

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or to know the composition of floor coverings before insecticides are applied in kitchens or other areas, so at least an elementary familiarity with wood will help you in your control of fungi or insects that live in or on wood.

It is also common knowledge that some trees have broad leaves and some have needles. It is probably unfortunate that the common names chosen to distinguish between these two types of wood were chosen, for the terms betray the truth about the woods. The term applied to broad-leaved trees is hardwoods and of needle-leaved trees—softwoods, despite the fact that some hardwoods are soft and some softwoods are hard so far as texture is concerned. An oak or maple floor is a hardwood floor whereas a pine floor is not (even though the wood might be very hard or tough). These terms are important, for if we later say that certain beetles attack only hardwoods, you will know we mean only the wood from broad-leaved trees.

If you look at the end of a log from either a hardwood or softwood tree, there will usually be four distinguishing characteristics of the wood. Usually there will be one circular area that is darker than the others. These two areas are known as heartwood and sapwood (Figure 1). The inner area is the heartwood (from the heart of the tree), the outer area the sapwood. The relative amount of one to the other may vary considerably from tree to tree. This is important, for lumber produced from these two areas of the log will also vary in its susceptability to fungus or insect attack.

The other distinguishing features visible on the end of a cut log are the rings. Almost everyone has been taught that you can determine the age of a tree by counting the rings. Close examination will show that when one counts the rings, he counts the heavy or dense structured rings, but these are separated by a less dense and often more porous summerwood, the less dense ring. The more dense ring is called the springwood, (Figure 2). The two rings together are called one annual ring. When the log is cut into lumber, these rings give the texture referred to as edge grain or flat grain. They can play hob with paintability, and they can also influence the ease with which the wood is attacked by insects or decay.

By now you are probably asking (under your breath, of course, in order to be polite)—what good does it do me to know this stuff? We'll get to that in a minute. In the meantime, let us go just a little bit further into this matter of wood composition. Wood is composed chiefly of four items, namely, **cellulose**, which makes up about 70% of the wood substance; **lignin**, which accounts for 18% to 28% of the wood; **extraneous materials** consisting of ash forming minerals (0.2% to 1.0%); and **extractives** which make up the remainder. The cellulose is the fibrous part of the wood, the lignin is the cementing material that holds the fibrous portion in place, and the other materials are solids or liquids in or intimately associated with the wood cells.

So what? So when a tree is cut down and made into usable articles, it is no longer alive, and it is, therefore, subject to the rule of all matter—"ashes to ashes and dust to dust." In nature, living matter is marked by growth; dead or non-living matter is marked by its tendency to deteriorate or decompose. Since wood and wood products in a structure represent dead organic matter, such wood is subject to deterioration unless protected in some way. Often the PCO is called in to help the prospective client find suitable ways of protecting his wood products from deterioration, and it is then that you dem-

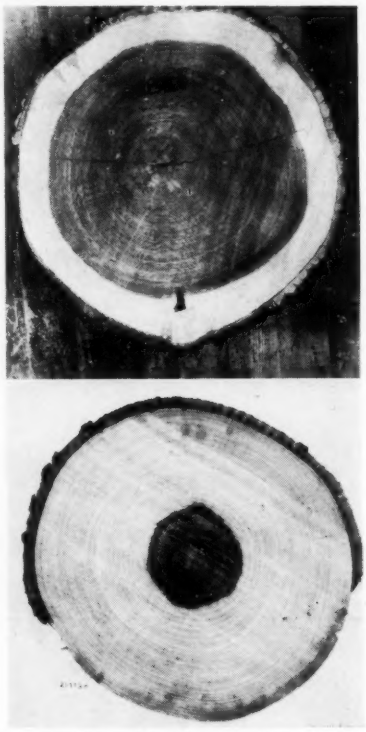

Fig. 1.—Heartwood and sapwood, vary from tree to tree, as shown in the above two log sections. Heartwood is the darker center area.

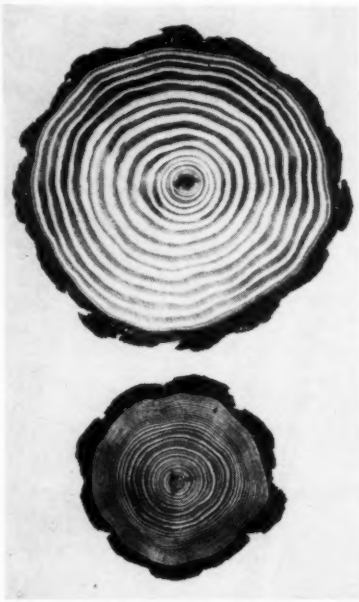

Fig. 2.—Springwood and summerwood rings are evident in these cross-sections of two logs. The springwood is the dense ring and the two together make up one annual ring. The top section is from a slow-growing tree, the other from a fast-growing tree. Photos were furnished by the U. S. Forest Service.

Eastern Entomologist Endorses Pre-Treating

The cheapest way to insure dwellings against termites is to have them termite-proofed while under construction, according to Louis Pyenson, entomologist with the Long Island (New York) Agricultural and Technical Institute.

Writing in the Architecture and Construction Research bulletin, published by the Long Island Home Builders Institute, Inc., Pyenson said such termite-proofing while the home is under construction is the cheapest defense against termites.

"This involves both chemical treatment of the soil by a reliable exterminator and approved methods of termite-proof construction," he explained. "Waiting until termites attack is a much more expensive proposition for the homeowner . . . It is time builders avail themselves of an excellent selling opportunity."

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Malathion kills resistant insects

...versatile phosphate insecticide has many applications plus low toxicity to man and animal

Every year the resistance of insects to chlorinated compounds becomes increasingly serious. Bugs now resistant include: roaches, flies, mosquitoes, fleas, lice and bed bugs. Experience has taught many pest control operators that increasing dosage or number of applications with the older materials wastes time and money.

Where resistance is a problem, organic phosphate insecticides give good control; but many of these are highly toxic to man and animal. However, one of the most effective phosphates — malathion — is *low* in toxicity to man and animals. The U. S. Public Health Service says in *Memoranda on Economic Poisons*, "...the toxicities of malathion (oral and through the skin) are less than those of DDT."

Resistant roaches

The German roach is typical of the resistance problem. A resistant strain was found in Texas in 1952. Today this strain is widespread and two hundred times as resistant to the most commonly used chlorinated hydrocarbon as normal roaches.

Malathion's low toxicity makes it ideal for roach control as well as many other pest control operations. It is recommended for use against silverfish, earwigs, flies and can be used in restaurants and food stores where highly toxic materials are prohibited.

Fly and mosquito control

Malathion kills fly maggots, mosquito larvae and the adults of both insects. All forty-eight states and the USDA recommend malathion for fly control. It gives quick knockdowns, high kills and control lasts up to four weeks.

Malathion controls practically all insects on ornamentals

Malathion — alone — kills aphids, mites, beetles, worms, scales, leafhoppers — almost every pest that attacks ornamentals. This complete control (in 1958 malathion has USDA acceptance for over 105 different insects) plus malathion's low toxicity make it ideal for estate, park, and township insect control programs.

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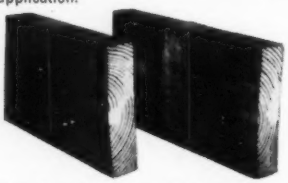
Southern Yellow Pine penetration test shows WOODTREAT-TC on first day of application.



Four days later. Note diffusion of Penta and oil from point of application to end of plank. Dried crust is almost ready to flake off or be brushed off.

Cross section of above boards at point of application. Penta has made deep penetration in 4 days!

Lasting protection against termites, wood borers and decay—new WOODTREAT-TC is a deep-penetrating patented oil-in-water emulsion toxic coating containing 10% Penta by weight in the oil phase. It is paste-like in consistency and holds the Penta-oil phase in suspension until it penetrates the wood in a few days.

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onstrate whether you are or aren't a pest control expert.

If the PCO is to do an intelligent diagnosing job and recommend methods for the control of wood deterioration, he must be familiar with wood and with the organisms that can degrade it. Diagnosing the cause of any pest problem comes before the application of proper control methods. Proper diagnosing will also result in a minimum of recalls because of failure to correct the problem. Let us, therefore, list some of the deteriorating agents that can give the prospective client concern, and you can see if your training and advertising will make him turn to you for the help he desires.

Turning our attention first to the composition of wood, we will note that it is composed of cellulose, lignin, extraneous matter and extractives. Actually, each deteriorating agent is usually chiefly interested in only one of these items. It is generally conceded that termites utilize cellulose for food; that what are known as brown rots attack chiefly cellulose. The rots known as white rots attack chiefly lignin. Powder post beetles utilize starches for food; if wood is low in starch, either these beetles will not attack it or will do insignificant damage to it. Blue Stain organisms seem to be interested in soluble materials from between the wood cells, and the same is probably true for the molds.

Since each component of wood can contribute to the successful attack of the various organisms, we should become familiar with the organisms that might be involved. Otherwise guesswork might be used instead of scientific diagnosis. If you know no more about wood or its characteristics or about organisms that might attack wood than does your prospective client, you are really not in a position to do a professional job of diagnosing nor can you be assured that you will use the proper control method.

The second installment of author Hatfield's three-part series on wood destroying organisms, to be published next in April, will deal with diagnosing causes of trouble and selecting control methods and materials.—Ed.

Which Is Which?

One of the two insects below destroys wood, the other feeds principally on dead and decaying vegetation. In the field would you know which is which?

By **RON HUNT,** Naval District Public Works Office, San Diego, California

The winged male embiid (Order Embioptera) can easily be mistaken for winged reproductives of the western subterranean termite (Reticulitermes hesperus). Even experienced termite operators have identified embiids as winged termites. The differences that are readily visible under magnification are obscure to the naked eye. The embiid specimen used for the drawing below was collected by a homeowner who was convinced he had termites.

Male Embiid
(Females are Apterus)

Termite Alate
(Winged Reproductive)

Male Adult Embiid (Probably Embia californica-Banks)	**Alate of Subterranean Termite** (Reticulitermes hesperus)
Description	
Small, slender insect with chewing mouthparts and gradual metamorphosis. First segment of the front leg tarsus enlarged containing glands and spinnerets for web production. Fairly large compound eyes and filiform antennae. Wings longer than body, similar in form and structure, dark colored, and venation simple. Length, including wings, approximately ⅜". Females wingless.	Small, slender insect with chewing mouthparts. Has beadlike antennae and dark colored bodies. The clear wings are folded flat with basal fractures to permit shedding. These two pairs of wings are similar in shape and have netted venation. Has incomplete metamorphosis and an approximate length of 7/16 inch (including wings).
Food	
Lives on dead and decaying vegetation with fungi as a probable component of diet. Not considered an injurious insect.	Feeds mostly on wood and wood products but may also attack linoleum, leather goods, fungi, dead roots of living plants; in fact, any dead vegetable substance. Causes moderate to severe damage to wooden buildings.
Habits	
Both adults and nymphs spin web-lined tunnels or webbed-over galleries under stones or other objects lying on the ground. Nocturnal feeders but quite active on overcast days.	Social insect living in colonies often deep in the ground in crypts or tunnels. In order to control both moisture and temperature, they quickly seal any break made in their tunnels. They carry their "climate" to their food supply by tunneling into or over its surface. They have a highly developed caste system similar to bees and ants.

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This Muncie, Indiana TO
Is Never Without the Right Tools
When He's On A Job in His Tailor-Made

TERMITE EQUIPMENT TRUCK

Termite Operator Robert Lewis, of Muncie's Lewis Pest Control, boasts a 1957 Chevrolet truck with the latest in compartmental gadgetry. Built-in are nine separate storage cabinets, all 15" deep. Sizes vary from 8"x1½' up to 1½'x5'. A John Bean pump that puts out seven gallons of chemical a minute is installed in the open rear of the vehicle. Pump's tank capacity is 200 gallons. Body was built by Powers Co., St. Louis.

ALMOST A BRANCH office for Muncie, Indiana's Lewis Pest Control (boss is Robert M.) is this specially designed and fully-equipped 1957 Chevrolet ¾-ton truck, loaded with virtually every piece of equipment a termite operator needs on a job.

One of the Chevrolet 3200 series, the truck has heavy duty springs, brakes, and clutch; plus a four-speed transmission and power take-off to run a John Bean seven-gallon a minute pump installed in the open rear of the vehicle. The pump has a tank capacity of 200 gallons and an electric hose reel with 200 feet of ½-inch hose.

Builder of the truck's body was Powers Co. of St. Louis, Mo. Above a trailer hitch on the rear of the truck is the power take-off shaft, which permits operation of an auxiliary mounted pump that can be hauled in tandem on the hitch. Sides of the truck, as illustrated, have ample cabinet space for drills, electrical cords, chemicals, drill bits, and the numerous other accessories a termite operator can't afford to be without on a call.

In all, counting 12 pigeonhole compartments as one cabinet, the truck has nine separate storage cabinets, each about 15" deep. And these are not haphazardly designed catch-alls either. Everything has its place.

On the driver's side, one 1½'x 1½' compartment was built for extra hose, etc.; and another, 1½'x5', over the wheel is convenient for shovels, spades, or other long tools. The storage box divided into 12 compartments is ideal for small tools that might otherwise rattle and bounce around in a larger compartment. The other cabinet on this side is 8"x1½' in size.

On the passenger side of the truck are two 9"x5' compartments—one over the other—another 2½'x3½' closet for bulky electrical cords, rope, etc.; a 1'x1' area for boots or smaller items; and another 8"x1½' cabinet for rags, small tarps, etc.

"The truck has proved to be handy and makes the work much easier because of its compactness," owner Bob Lewis says. "Everything needed for a termite job is available at the job."

When it rains, all the driver has to do is unroll a custom-made water-proof canvas down over the pump and secure it tightly on the sides and back of the truck with special metal fittings. When not in use, the canvas is rolled up behind the pump next to the cab. There it is out of the way, but immediately available if showers blow up.

"We also have a ¾-ton Metro specially equipped much the same as our Chevrolet," Lewis says, "but for ease of handling and parking, we have found the Chevrolet much better."

PCOs who attended the Purdue Conference late last month in Lafayette, Ind. were scheduled to get a look at Lewis' truck, which was to be on display.

Termite Truck. Above are four views of the 1957 Chevrolet, 3200 series, truck custom engineered to the on-the-job needs of Termite Operator Robert M. Lewis. Top illustration shows the John Bean pump in the rear of the vehicle, the next two photos picture the spacious capacity of the truck's side storage compartments, and the bottom shot shows the canvas covering used to protect equipment against the weather. Body designer was the Powers Co., St. Louis, Mo.

Repellent Round-up

Rodent Roach General Insect Bird

WITH THE MOUNTING problem of pest resistance to many chlorinated hydrocarbons and the possibility of future resistance to some organic phosphates, several chemical suppliers are funneling their energies in new directions.

"One field being explored at present is repellents," Dr. Philip J. Spear, Technical Director of the National Pest Control Association, relates. "These are repellents for insects, birds, and rodents; and in some of these, I think we have a very serious interest."

Rodent Repellents

James B. DeWitt of the U. S. Fish & Wildlife Service's Patuxent Research Refuge, Laurel, Md., and Jerome C. Besser, USF&WLS Research Laboratory, Denver, Colo., have established three criteria of effectiveness for a rodent repellent:

1. It must prevent or deter rodent entry into treated areas, gnawing attacks upon treated paperboard and other packaged materials, or ingestion of treated food.

2. It must have a low order of toxicity, or be capable of application in such a manner that its use does not involve possible contamination of foods stored in or near treated articles, nor offer hazards to persons handling these materials.

3. It must not have objectionable odors or tastes under use conditions; and must not have adverse effects upon appearance, strength, or durability of articles to which it is applied.

"As yet, no material has been shown to meet all these requirements," chemist DeWitt reports.

Chief use for rodent repellents probably would be in food plants, where food often is in competition with bait materials. Repellents could drive rodents from food areas to untreated areas absent of food. There, baits might look more attractive to them.

Another potential use is in treatment of doorways, particularly around loading dock areas such a headache to rat-proof.

The large, heavily-infested apartment house offers additional opportunities. Such buildings are usually always difficult to bait with rodenticides without dangerously exposing inquisitive youngsters or ignorant adult tenants to the poisons. But the problem is reduced and the safety element enhanced if the building can be sprayed with a repellent to shoo rodents into untreated areas, possibly the basement, where anticoagulant baits or more potent poisons can finish them off.

An equally important consideration is the PCO's customer himself. He wants immediate results. Repellents should give him this apparent relief quicker than anticoagulants, since the latter usually require several days to kill.

Approximately 7,000 chemicals have been tested in repellent studies underway at the Patuxent Research Refuge and Denver's Wildlife Research Laboratory.

"Most of these have proven ineffective, too toxic or too expensive for general use," according to biologist Besser. "The most effective repellent, actidione, is a by-product in the manufacture of streptomycin, and repeated tests have shown that rats and mice will die of starvation rather than accept food or water containing very small percentages of this compound. Unfortunately, it is highly toxic and expensive."

One of the newest rodent repellents is Cefro, VC 3-100, developed by the Virginia Carolina Chemical Co., Richmond, Va. According to last reports, it is not on the commercial market yet, but is undergoing intensive experimentation that could lead to its general sale. The NPCA Rodent Control Committee is investigating the candidate repellent to determine the potential for it in field use, other than as a package-coating material. It reportedly has a toxicity comparable to DET and Lindane.

"Cefro is not going to be easy to apply," Dr. Spear said at a Florida meeting last year. "It is not impossible, but the nature of it is like a latex paint, the present formulation being in liquid form. There is also a granular preparation, but we question its utility."

In one NPCA Rodent Control Committee test last summer with this granular form, Cefro was applied to a 6-inch space beneath stacks of sweet feed in a dilapidated feed warehouse. At one end the chemical was placed along the floor and outer space of the platform. Anticoagulant bait stations were set up around the perimeter of the plant. For about 30 days, all rodent damage to bags ceased, there was "excellent" acceptance of the bait formula, and successful control resulted. At the end of the 30-day period, bait stations were discontinued, and damage once more occurred.

"Results of this test," says committee chairman Truman Thomas of the Anti-Pest Co., Shreveport, La., "indicate a temporary repellent value over a 2- to 4-week period with gradual loss of effectiveness of the compound."

Roach Repellents

Roach repellents may be utilized in much the same manner as rodent repellents. Specific objects, such as beverage dispensers or crates used to carry soft drink bottles, may be protected if the roach can get to an untreated area. The same would apply, of course, to certain areas in apartment houses, such as the kitchen. As in the case with rodents, roaches may be forced from one unpoisoned area to another Chlordane or Diazinon-treated

Yellow lights don't repel insects, as many people think, but at least they don't act as a lure.

Entomologists at Virginia Polytechnic Institute in Blacksburg report insects largely stay away from yellow lights because they can't see them. They are attracted, instead, to blue (regular bulb) and ultra violet light.

So if customers ask you how to cut down nighttime bug populations during an outdoor picnic, suggest they burn a strong blue light in a remote corner of the picnic area. That should draw the bugs away and leave the peopled area relatively free of insects under the yellow light.

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ANTS • SPIDERS • WASPS • SILVERFISH • EARWIGS • CRICKETS • FLEAS

Spray or paint with hand or power equipment where insects are seen or hide. Treat such places as baseboards, inside cabinets, under sinks, drainboards, stoves, storage units, in cracks and crevices, behind shelves, in basements and attics and so forth. Most surfaces — including metal — so treated, will continue to kill these insects for several weeks. Treat thoroughly and repeat as necessary.

MOTHS • CARPET BEETLES

Clean and spray thoroughly to reach all hiding places. Clean and brush fallen articles. Hold sprayer 2 feet from articles sprayed so as to thoroughly moisten, paying particular attention to seams and folds. Allow sprayed articles to dry completely before using. Repeat application every 30 days unless articles are stored in moth-tight containers previously cleaned and sprayed with the above mixture.

BEDBUGS

Take beds, dressers and other furniture apart and thoroughly spray slats, springs and all cracks and crevices. Thoroughly spray entire mattresses, especially seams and tufts, and allow to dry completely before using. Spray all cracks and hiding places in rooms — behind woodwork, loose wallpaper, picture frames, molding. Repeat applications as necessary.

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area, where they can be killed.

Two widely publicized, comparatively new roach repellents are R-11, a product of McLaughlin Gormley King Co., Minneapolis, Minn. (PC, June '57, pg. 28) and Tabutrex, manufactured by Glenn Chemical Co., Inc., Chicago, Ill. (PC, Jan. '57, pg. 22). The LD-50 or measure of toxicity of R-11 is an estimated 2,000 milligrams per kilogram compared with about 8,000 milligrams per kilogram for Tabutrex, which puts it in a class with methoxychlor and pyrethrum.

Reports Dr. Spear: "Among suppliers who concentrate on the pest control field, the evaluation of Tabutrex and R-11 has not been such that any of our long-time suppliers has shown too much interest in either of these materials. I do think they need to be looked at carefully, for they may have possible values, and I suggest these as the better possibilities."

General Insect Repellents

As far as new general insect repellents go, DET, developed jointly by the U.S. Departments of Agriculture and the Army (PC, May '57, pg. 52; June '57 pg. 48), is reportedly effective against mosquitoes, chiggers, ticks, fleas, and biting flies.

There are three forms of DET, but two are of chief interest to the pest control industry. These are the meta and ortho forms. A high concentration meta isomer of DET is currently being offered by Montrose Chemical Co. of Newark, N.J.

"The meta form apparently is the best of the three," according to Dr. Spear. "About 30% of the ortho form is often found in effective mixtures, and the USDA feels that gives the best combination, that is when there is about 70% of the meta and 30% of the ortho forms."

Bird Repellents

Industry research into bird repellents is still in its early stages, but progress in formulation development is evident.

"A few firms have pioneered in the supplying of sticky repellents for the dispersal of birds," George Hockenyos of Sentinel Laboratory, Springfield, Ill., states. "The composition of these materials has apparently not been revealed or patented. They are of two general forms. One is a paste. which is applied to some depth by means of a paddle or usually with a caulking gun; the other form is a liquid spray which is used chiefly on dormant trees.

"Four of the paste and two of the spray compositions have been examined for properties, but not analyzed for ultimate composition. All are effective if properly used, but all have some disadvantages."

Hockenyos is currently testing a number of new compounds which seem to appear superior to materials now commonly used.

One of the wrinkles to be ironed out in the application of tree spray formulations concerns equipment. Some practical device is needed to get the sprayer up into tree, since one cannot stand on the ground and spray upward without getting the formulation on him and the ground.

Use of repellents in routine pest control work is a new and unfamiliar experience for PCOs, but it's probable advantages are stimulating research into both methods and products by suppliers, government agencies, and the NPCA.

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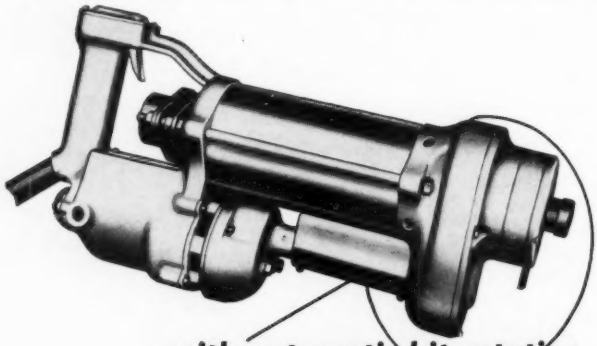

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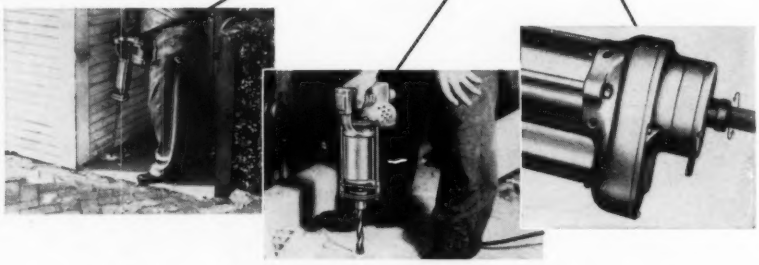

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How We Get Complete Coverage of Sub-Slab Soil With Termite Chemicals

by **WILLIAM J. SPITZ,**
Big State Exterminating Co., Houston, Texas

CONSTRUCTION of concrete slab foundations for homes and commercial buildings has, to a very large degree, replaced the use of pier and beam foundations in the Houston area. As a matter of fact, slab foundations are used to a much greater extent in many parts of our country. Some years ago it was thought termites would not and could not penetrate these concrete foundations and enter directly into the wooden floors and studs of the home, but most TOs realize this has proven to be a fallacy.

It follows that if termites can penetrate concrete slabs through a weakness, pin hole, or a crack in the foundation, it would be well for some of us to reappraise our methods of treating concrete slabs. Treatment of the foundation perimeter and saturation of the slab opening around bath-tub pipes would appear insufficient if we are to give our customers complete protection and real value for each dollar spent.

About six years ago when we were treating concrete slab buildings by the method described above—e.g., by treating the perimeter and around the bath trap—we found we had a great deal of trouble with termites coming through the slab and doing damage inside. The customer, of course, would look to us and say, "You guaranteed it, get rid of these termites!" A crew would be dispatched, and we would treat through the top of the slab. This was only effective in the localized area that was treated. There were times when this service was successful, but there were also too many times when this "spot-treatment" only caused the termites to move over and attack another vulnerable spot in the house. This meant additional expenditures, by us, to obtain control. About five years ago we made a drastic change in our methods regarding the treatment of subterranean termites that attack any building constructed on a concrete slab. It is this particular method that I will try to describe to you.

Our inspector first tries to determine where the termites are entering the building. When there are no signs of termite activity visible on the outside of the slab, it is usually easy to convince the customer they are gaining entrance through a weakness in the slab and destroying wooden members of the building.

Then — and this is very im-

Fig. 1.— (top). Heavy body pressure is applied to the drill to prevent its tip from slipping on the slab's flat, concrete surface.

Fig. 2.—About 28 inches was the distance author Spitz's fieldman had to drill to penetrate the foundation beam pictured above. The serviceman is measuring the 28 inches on the drill to show the depth it penetrated.

Fig. 3.—A 22-foot rod is manipulated, by a Big State Serviceman, into the 1 1/8-inch hole drilled just beneath a four-inch cap of the slab. To work the rod in, Spitz uses a heavy heav-ho body motion.

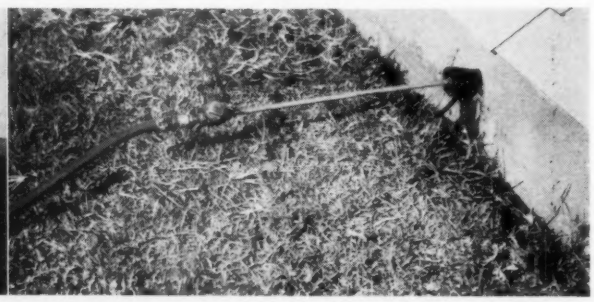
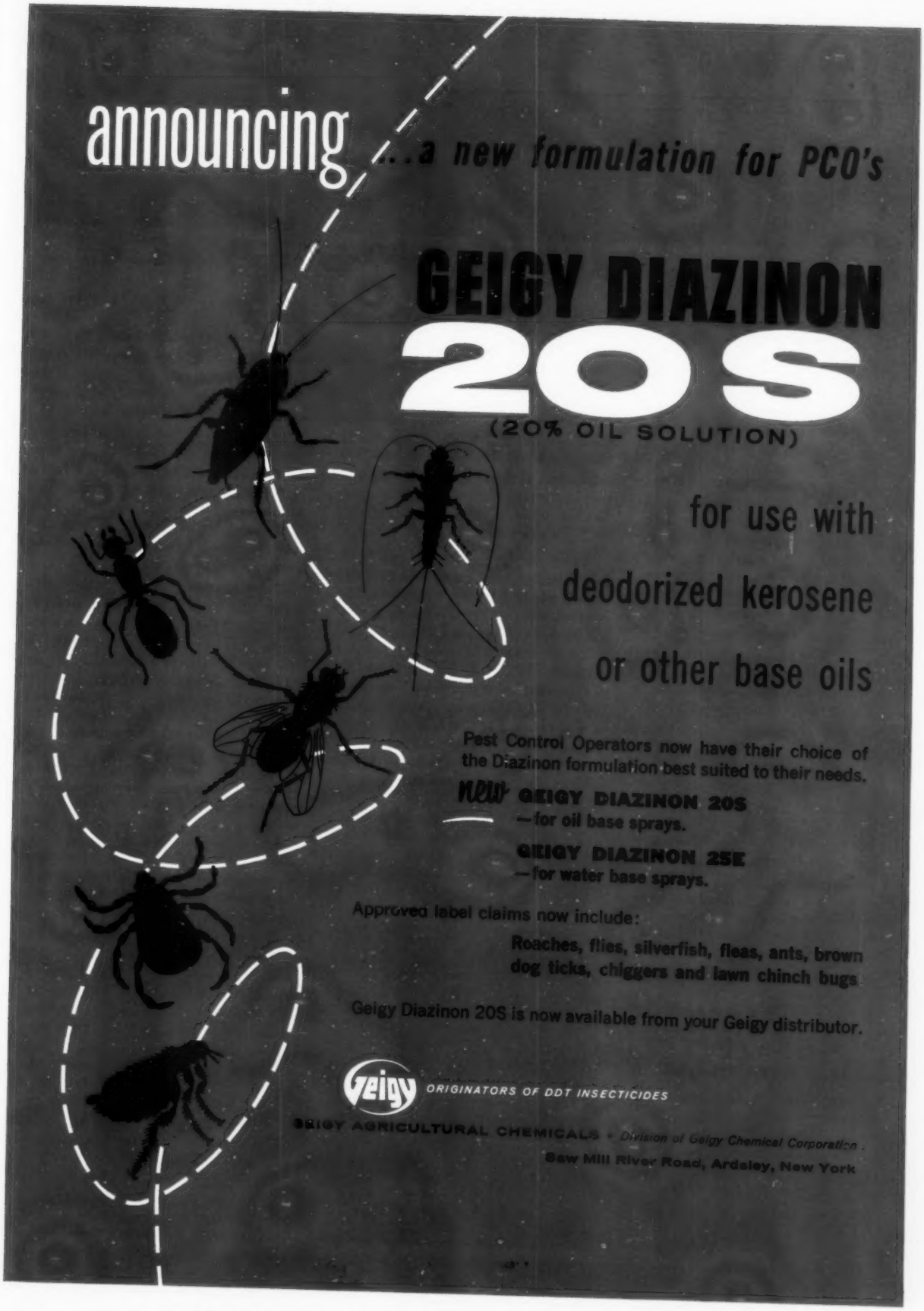


Fig. 4.—To prevent premature backflow of his chemicals Houston PCO Spitz uses a neoprene cone (shown above) that fits over his pipe and seals the drilled opening through which the rod penetrates.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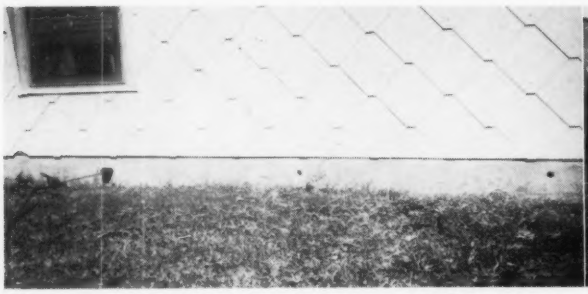


Fig 5.—Holes are drilled at some heights, and at 6 foot centers, as shown above, in sub-slab jobs Spitz does. Once steel supporting beam is missed in one hole, the operator should also miss it in most others.

Fig. 6—Saturation coverage is the Spitz by-word in sub-slab work. His servicemen pump as much chemical under a house as soil will hold. Above, note the outflow of chemical from the drill hole on the right.

portant — we try to determine from the homeowner and also from foundation plans, if available, whether or not any water or gas pipes, telephone conduit, radiant heating pipes, electrical cable or any other objects were placed under the slab during construction. The exact location of these pipes or conduits is very important, and this particular step is extremely vital since the life and health of your crew can be endangered and costly damage can be done if any one of these pipes or conduits is broken during the drilling process.

In a great majority of the cases in the Houston area, the only pipes we need concern ourselves with are the sewer lines. Water and gas lines are usually brought into the house above the slab and run through the walls or through the attic.

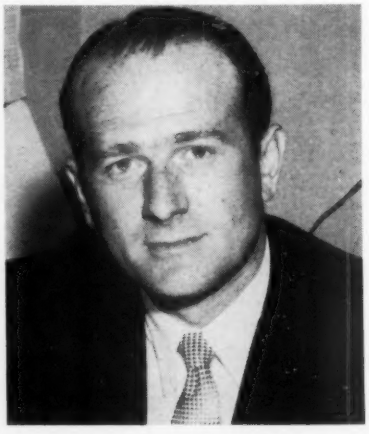
On the Dallas home we treated in a demonstration for the Texas Pest Control Association convention (P.C., Jan. '58, pg. 36) we learned immediately that both gas and water pipes ran under the slab. It was determined by the position of the water meter near the curb and the direct line of water outlets for the kitchen sink, the bath-tub, and lavatory that these pipes were running in a straight line. We did not have much of a problem determining exactly where they were.

Determining Drilling Height

Our next step is to determine the height we are to drill. Taking into consideration thickness of the hardwood floor and screeds and also the 4 inches for the cap of the slab, we drill at a height which permits us to bore a hole that will bring us immediately under the 4 inch cap to the sand or gravel fill.

We set our drill, as shown in **Figure 1** and exert heavy pressure in order to prevent the drill tip from racing all over the flat concrete surface. Then the serviceman leans the butt of the H-22 Cleveland Hammer-Drill against his thigh and pushes it on through. **Figure 2** graphically shows the depth that we had to drill in order to get through this concrete beam. In this particular case it was approximately 28 inches.

After the house is drilled with 1-1/8 inch holes on 6 foot centers on all sides of the structure, we commence the treating. You will notice from **Figure 3** that the rod is quite long. In this particular instance it is 22 feet in length. We push the rod in with a back and forth, heave-ho action until, as shown in **Figure 4**, we have inserted the rod approximately 20 feet. The chemical flows at about four to five gallons per minute all during the insertion to prevent clogging the tip and also to make the insertion process much easier. **Figure 5** shows the distance between the holes which, as I mentioned, are on 6 foot centers. Please note that they are all at the same height. This is important due to the fact that in many cases if you miss the steel in one hole, you will miss it in most other holes, providing they are drilled at the same height.



Writer Spitz demonstrated his sub-slab termite treatment method at the Texas PCA Meeting late last year (PC, Jan. '58, pg. 36).

In **Figure 6** you get a picture of the entire idea behind this particular method of treatment. We pump as much material under the house as it will hold. Usually, this is between 800-1,200 gallons of material per 1,000 square feet of area to be treated.

The neoprene cone that fits over our pipe prevents a premature backflow of the chemicals from the opening through which we are treating. This gives us excellent lateral coverage including right along the foundation wall. We get better than 3 ft. lateral spread of our chemical on either side of our treating rod as it is being pushed in. **Figure 6** shows chemical flowing freely out of a hole 6 ft. to right of our treating rod, but all holes are treated regardless of backflow. This is done in order to be as sure as we can that every single square inch under the slab will be protected from termite entry.

Visualize the grid pattern that our treatment makes under the building and you will agree it would be difficult to miss covering any vital area under the slab, with normal conditions. You may say a tremendous amount of material is being pumped under the house. That is true. However, I would like to explain that we reduce the percentage of technical material and increase the volume of water. Instead of using a 1 or 2% emulsion of Chlordane or any other suitable material, we use a .025% Chlordane emulsion and use a much greater volume of water than would ordinarily be used if the foundation was of

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"Progressive Chemicals for Industry"

A 60-cubic foot compressor with its own trailer, as illustrated above, powers Big State Exterminating Co.'s air equipment. The pump used is made by Hypro Engineering, Inc. and has a capacity of five gallons a minute at about 70 pounds pressure. Chemical is in tanks on truck bed.

pier and beam construction. In that way, more than a sufficient number of pounds of technical material than need be under a house is there. Our guide is to attempt to get at least one and one-half times the dosage recommended by the BRAB report dated May 10, 1956.

We feel it is important to bear in mind that the amount of material a job will take will vary, depending on the locality. In other words if there is a 4 inch sand cushion over gumbo it will take less material than the same house built on sandy terrain.

There is no set-rule that everyone in different parts of the country can use regarding the percentage of chemical and the amount of mixed material that will be put under any house of any particular size. This will have to be determined by your own experiments in using this method.

In addition to drilling and rodding beneath the slab, we also treat around the entire outside perimeter of the foundation and saturate the bath-trap. As far as the bath-trap is concerned we will put in as much material as the particular trap will hold. Here again, we do not want to take any chances of leaving any area with an untreated passageway which termites might work through.

Guard Against Oil Solutions

At this point I insert a word of caution. You will be taking a chance of damaging the property being treated if you use an oil solution chemical. The oil may work its way through the slab, if it is cracked, and bleed into the wood and sheetrock, causing a condition extremely difficult to rectify. We have seen jobs that were done with an oil base material; and once the oil started to bleed into the wood and sheetrock, it could never be eliminated. The home-owner painted and refinished the floors, but within a short period of time the oil bloomed through the new paint and varnish. Furthermore oil will soften the mastic used to hold the screeds firmly to the concrete.

The equipment that we use includes a Cleveland H-22 hammer-drill, a Hypro-pump with a capacity of about five gallons a minute at approximately 70 pounds pressure. Our air equipment is powered by a 60-cubic foot LeRoy Compressor which has its own trailer. Our tanks vary from 100 to 200 gallons capacity. The rods we use are ¼ inch ID galvanized pipe and we use a Quaker's Versital one-half inch ID neoprene hose with neoprene inside and outside. We have found that this hose holds up quite well under various conditions.

These few precautionary statements, I believe, bear repeating. Be careful of any pipes or conduits that may be laid under the slab. Be sure to use a water base material to avoid blooming. Furthermore the actual percentage of the technical material you intend to use in each tankful will have to be determined by you, after you have tested the particular type of construction and

(Continued on page 51)

16 Full-Size Photo Reproductions

Identification of Common Insect Damage to Wood

Seen in Buildings in the Northeast

by

DR. W. B. BECKER

Massachusetts Agricultural Experiment Station

•

A Reprint Showing Identification of Damage Caused by

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Carpenter Ants
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Let's Look At Our Credit Policies

by WARD A. COMBS

Presto-X Company, Omaha, Nebraska

For the past several months PCOs have probably been experiencing the extension of some 30-day payment accounts to 60 days, which means your accounts receivables become 60-day assets instead of 30-day assets. In such instances you should be alerted to re-evaluate each account that tends to extend its credit. With the facts available, you have to determine if your confidence in the client's ability to pay should be lessened. You will find some of your clients will not be able to withstand a tight-money economy.

It might be well for you to pause to realize that, along with pest control, you are engaged in the science of credit extension.

In most pest control operations, loss through bad-debt service accounts probably does not exceed 2%. But even at this seemingly mild percentage, a PCO is out-of-pocket $1,000 on $50,000 of business. With this in mind, it pays to keep a cautious rein on credit.

Bad credit experience with the larger, well established firms is very limited. The real concern involves extension of credit to the smaller enterprises, such as the "Ma and Pa Corner Grocery," neighborhood taverns, small restaurants, and new, unestablished companies—businesses comprising basically the $5 to $15 contracts.

There are several sources of credit information available: Dun and Bradstreet, local affiliates of the National Association of Credit Men, Retail Credit Association, etc. If your potential client has an established rating, you will already be aware of his ability to pay. Generally, however, smaller independent firms are seldom listed with the above organizations.

In a number of states, there are trade groups organized within regularly established credit associations. For example, within the Omaha Association of Credit Men, which is an affiliate of the National Association of Credit Men, there is a group for plumbers, electricians, retailers and manufacturers. Each of these groups exchanges credit experience on people they have done business with. As PCOs become better acquainted at local levels, a similar procedure might be developed for the interchange of credit information on clients.

Another source of credit information may be the prospect's banker and several firms with whom he has done business. However, this procedure takes a little time, and, of course, the prospect would list only suppliers with whom he has a good payment record anyway.

One of the PCO's most reliable sources of credit information could be himself or one of his representatives, who visits the customer's place of business regularly. Many firms rely heavily on their salesmen's judgment of the ability of the customer to pay.

Now, despite this extensive screening, a bad account may still get on your books. Unless the PCO keeps after him, the delinquent client will gradually get behind one month, then another, and before long the account is six months in arrears. Two or three polite attempts fail to bring the account up-to-date, and, during this interlude, another month or two of charges are compounded to the balance already due. Now he owes for eight months. If and when this account is partially or completely paid, it is time to re-evaluate credit privileges to be extended the client.

The operator will have to decide whether to maintain the contract, and, if he does, whether it should be maintained on a current basis. Since payment has been made, the operator will likely continue to service the account, but past experience will have to determine credit privileges.

Payment from the client under the new setup might be on a C. O. D. basis at the time he receives service. But sooner or later the once-delinquent client tells your service representative he will pay "next time." This generally leads to the build-up of another sizeable delinquent account.

When considering the credit of a client under contract, an operator is concerned with the performance of his commitment, as spelled out in the contract form. When payment is not received from a customer under contract, is the contract breached? This is a fine point and may require legal opinion.

Extension of credit in relation to contract accounts should be closely guarded. It would be advantageous for operators to adopt a systematic follow-up system for accounts that fall behind. Degree to which this can be done will depend upon amount of time available for details. Methods of procedure will vary, as will opinions.

Based upon an address presented at the 24th annual National Pest Control Association Convention.

Telephone Salesmanship

A 14-page booklet, "Selling by Telephone," is available free from the Public Relations Department of the Illinois Bell Telephone Co., Chicago 6, Ill.

The publication tells how to get your prospect's attention and interest, how to create desire for your product or service, and finally how to get him to say "yes."

PR Leaflet Available

A new leaflet entitled "Public Relations for Small Business Owners" has been prepared by the Small Business Administration, Lafayette Building, Washington, D.C. Copies may be obtained from all the agency's offices.

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What's NEWS In The Industry

W. Pa. PCOs Choose Becker

Western Pennsylvania Pest Control Association members recently chose as their 1958 president John Becker, Tri State Sanitation Co.

Serving with him in the new year are Abe Helfgott, Remo Sanitation Co., vice president; Nathan Page, Germo Sanitation Co., treasurer; and Harry Katz, Elco Manufacturing Co., secretary. All are from Pittsburgh.

Alfred Zimmern Dies

Alfred Zimmern, consultant and engineer, of Dallas, Tex., died of a heart attack January 8 while driving his auto between Fort Worth and his home.

Zimmern, a frequent contributor of articles on termite control for the readers of PC, drew most of the technical illustrations in the National Pest Control Association's Approved Reference Procedures for Subterranean Termite Control. He served as a consultant to the Antimite Company in St. Louis, Mo. and was a constant advocate of greater understanding of building terms by the termite operator.

Hawaiian PCA Members Feted

Hawaiian Pest Control Association members were recently dinner guests of Fumigation Services, Ltd., a new fumigation company in Honolulu owned by Dan Nishimura, Arthur Wong, and James F. Clark. Special guests included Francis Woo, Chief, Bureau of Industrial Hygiene; Dr. Henry Best, entomologist, University of Hawaii; George W. MacDougall, entomologist, U. S. Army, Pacific; and Robert Hind, entomologist, Pacific Air Force.

Ted Oser Forms Own Company

A 40-year veteran in the business, Theodore Oser has formed his own pest control firm known as Oser Pest Control, Inc., 1139 Spring St., N.W., Atlanta, Ga. Associated with him as general manager is Joseph D. Preston, who has been in pest control work for eight years.

Oser, formerly a vice president of Orkin Exterminating Co., started controlling insects and rodents in Richmond, Va., at the age of 12 by going to school in the daytime and working at night. He is past-president of the National Pest Control Association, having held that office for two terms, 1944-46. He is currently serving a five-year appointment on the Georgia Structural Pest Control Commission.

Oser Pest Control provides industrial and residential general pest control, fumigation, and sanitation counseling service.

Joseph Kahn wins Purdue research grant. A graduate student in the Department of Entomology, Kahn is shown, right, receiving Purdue's J. J. Davis Research Grant from Dr. John V. Osmun, Department Head, while J. J. Davis, Professor Emeritus, looks on. The grant is awarded yearly to a graduate student to encourage research in the area of structural pest control. Kahn is studying the movement of fumigants through various soil types, for control of sub termites.

Washington PCA Elects Kelley

Louis M. Kelley, Hygienic Sanitation Co., Inc., has been elected president of the Washington, D. C. Pest Control Association. Other new officers voted in during the recent annual election for 1958 include C. M. Venable, Terminix Co., vice president; Theodore D. Godek, Capitol Chemical Co., secretary treasurer; and Sam Durham, J. E. Gaskins Co., director. All are of Washington, D. C.

New Hill-Smith Business Mgr.

Milton L. Taylor has joined Hill-Smith Systems, Memphis, Tenn. as business manager, according to Myron W. Smith, president. Taylor previously managed another Memphis firm.

Daniel Picked by NYPCA

New president of the New York Pest Control Association for 1958 is Daniel J. Klein of Allied Exterminating Co.

Chosen with him at a recent meeting of the association were Stefan Rohdie, Excelsior Exterminating Co., first vice president; Dr. Arthur Brody, Pioneer Exterminating Co., second vice president; and Sidney Wimmer, Majestic Exterminating Co., who was voted 1958 secretary-treasurer.

New directors are Joseph Harris, Guarantee Exterminating Co., Jacques Hess, Exterminating Services Corp.; and Harry Rosenfeld, Wide World Exterminating Co. All are of New York city.

Moore Named N. C. Inspector

Harry B. Moore, formerly of Reliable Exterminators, Inc., Lafayette, Ind., has been made an inspector for the North Carolina Structural Pest Control Commission.

Moore had been with Reliable Exterminators since 1953. He received his M.S. degree in entomology from Purdue University and is a member of Pi Chi Omega.

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Purdue Termite Pretreatment Tests Include Granular Chemicals

The Purdue University pretreatment tests which were started in July 1956 for protection against termites have now been revealed to contain several treatments with granular formulations. Although the slab tests have been in progress for more than a year the use of these materials was not mentioned previously since their inclusion in the research project might be interpreted as suggesting a recommendation by Purdue for their use. Increasing number of inquiries, however, make it desirable to discuss the nature of the tests.

Granular insecticides are coarse, dry formulations of chemicals impregnated on various inert diluents such as fullers earth. The particles are about the size of coarse sand. According to Dr. John V. Osmun, Department of Entomology head, granular formulations of aldrin, chlordane, dieldrin, and heptachlor are present in various buildings of the tests. The materials were applied to the pea fill using a grass seeder and then gently raked into the fill. The polyethylene vapor barrier was then placed over the fill and the concrete slab poured. It is too early, Purdue says, to comment extensively on this method of pretreatment, but possible advantages at time of application include less labor, normally faster application than with liquids, dry soil beneath the membrane barrier, and less annoyance to the construction personnel working on the job at time of application. Whether as good protection will be afforded as with emulsions can be determined only with time. All of the test slabs pretreated are equipped with openings through which soil samples can be withdrawn each year for analysis and determination of lasting qualities. The first-year samples look favorable in all cases, Dr. Osmun reports.

These granular tests are part of an overall pretreatment research program underway under slab and conventional dwellings at Purdue University. Previous details were published in Pest Control, February 1957.

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Hollandia Equipment Show

The Hollandia Supply Co., 124 S. Urbana St., South Vienna, O. will hold its annual free Equipment Show and Service School February 18-21 for pest control operators.

Of chief interest to PCOs will be the Thursday, February 20 program from 9 a.m. to 7:30 p.m., featuring "Proper Selection, Maintenance, and Operation of Air Blast Sprayers" and "Proper Selection, Maintenance and Operation of Hydraulic Sprayers." A five-day, all expense-paid trip to Washington, D. C. by air heads the list of door prizes available to registrants.

A buffet luncheon will be served to all guests.

Whelan to American Fluoride

Helena A. Whelan has joined American Fluoride Corp., New York, N.Y., as its sales representative to the pest control industry. Miss Whelan was, until late last year, associated with Prentiss Drug & Chemical Co., New York, N.Y., in a similar capacity for 18 years.

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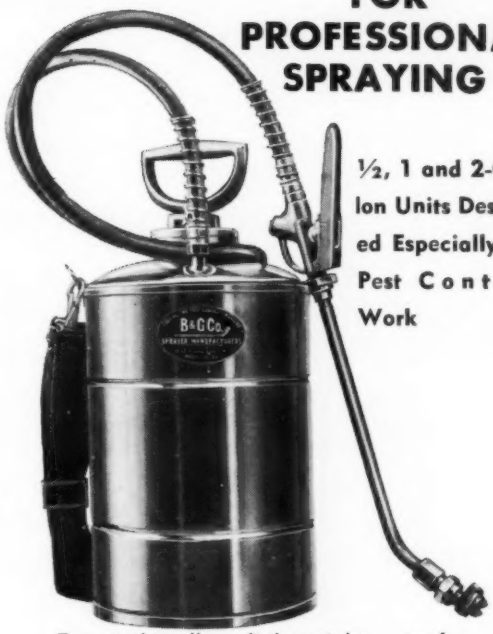

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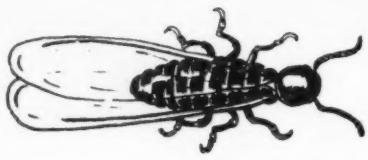

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Sub-Slab Termite Treatment

(from page 43)

the type of soil you have in your part of the country. These factors, as mentioned previously, vary greatly and make it impossible to give an over-all recommendation.

Effectiveness of Treatment

Now you want to know just how well this treatment holds up. It can be reported a very low percentage of retreatment has been necessary on the jobs that we have done in the last four years. It is true when we first started using this method there were details, such as quantity of material to be used, that we had to iron out for ourselves. However, the jobs done in recent years have been very successful. There are only a few isolated cases where termites reinfested a treated building. However, in each case there was a peculiar factor involved to which we could attribute the failure.

If you are not at the present time using some method whereby you can treat the entire under portion of the slab and if you have conditions reasonably similar to those in Houston, I can sincerely recommend this type of treatment. There is no question in my mind that after you have perfected your own specific methods the results will make both you and your customers happy.

Suppliers' Staff Changes

Appointment of **Thomas B. Sparks** to the industrial chemicals and pharmaceutical intermediates sales staff of Michigan Chemical Corporation, Saint Louis, Michigan, has been announced by H. Stanley Lawton, vice president of sales. Sparks will make his headquarters in Saint Louis.

Charles S. Hallock has joined the American Chemical Paint Company, Ambler, Pennsylvania. He will devote his time to American Chemical's rodenticide (Fumarin and FumaSol) program.

Bernard Willis has joined Velsicol International Corp. and will handle liaison with U. S. suppliers for worldwide distribution. He will headquarter in New York city. Velsicol International headquarters are in Nassau, Bahamas.

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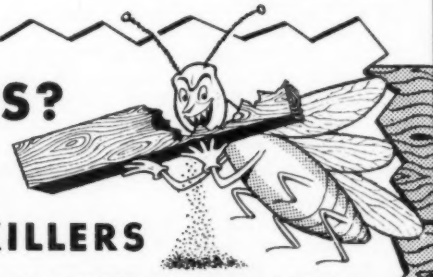
2. Stops new growth . . . has long-lasting killing action.
3. Easy to use . . . dry, dustless pellets are applied by mechanical spreader or broadcast by hand.
4. Low application rate . . . about 400 pounds per acre. (even less for annual weeds only)
5. A combination of 3 proven chemicals.
6. Ideal for use around factories, warehouses, storage tanks, lumber yards, parking areas, fence lines and many other similar locations.

If you offer a weed control service, you will want Chlorea Granular for its ease in use, low dosage rate and powerful kill. Apply early for best results.

FREE! NEW CHLOREA FOLDER AND WEED BOOKLET

TERMITES?
use
CHIPMAN
TERMITE KILLERS



ATLAS "A" • DDT SPRAY POWDER • SODIUM ARSENITE
CHLORDANE • LINDANE AND DIELDRIN FORMULATIONS

Write for Termite Control Circular

CHIPMAN CHEMICAL CO.
Dept. 7, Bound Brook, N. J.
Chicago, Ill., Portland, Ore., Palo Alto, Calif., Pasadena, Tex., Bessemer, Ala.

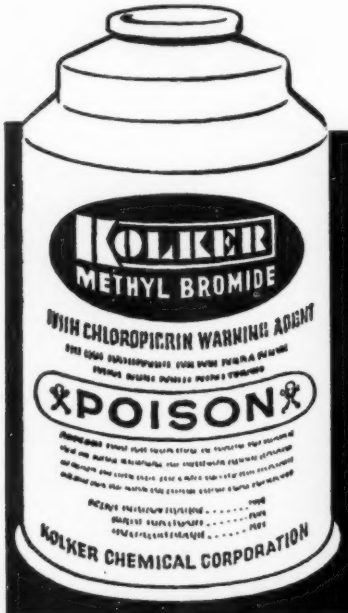
Thallium Poisoning Symptoms

A release from the American Medical Association, which urges the use of thallium sulfate be restricted to experienced persons, gives symptoms of poisoning for this pesticide.

"Symptoms of acute thallotoxicosis are variable, usually appearing in the gastrointestinal tract and nervous system. Loss of hair is the most familiar sign. Digestive disturbances include a metallic taste, salivation, nausea, vomiting, and abdominal pain. There may be puffiness of cheeks, eyelids, and lips, tingling and pain in the hands and feet, muscular weakness, delirium, convulsions, and coma," the release said.

Veterinarians to Cooperate

Plans are under way for joint cooperation between the Association of Animal Hospitals and the National Pest Control Association to effect the control of ticks on animals.



KOLKER METHYL BROMIDE

Now being produced at our modern plant in Newark, N.J., Kolker Methyl Bromide is the outstanding fumigant for the elimination of insect and rodent infestation of grain, tobacco plant beds, seeds, dried fruits, cereals, nursery stock and a wide variety of other products.

KOLKER METHYL BROMIDE

- Kills insects, mites and related pests in all stages of their development.
- Has a high degree of toxicity to a wide range of insects, rodents and other pests.
- Has rapid volatilization and a high rate of diffusion into stored grain, bales, packages and soil.
- Is non-explosive and non-flammable.
- Does not leave any residual odors, tastes or stains.
- Is economical to use.

KOLKER Methyl Bromide is packaged in one-pound cans, packed 24 per case for domestic shipment and 48 per case for export.

It is also available in cylinders of 50, 100, 150 and 450 pounds net capacity.

KOLKER Methyl Bromide may be ordered as a 100% product or with 2% chloropicrin warning agent.

For further information on this highly effective fumigant, please call or write us today.

KOLKER CHEMICAL CORPORATION
600 Doremus Ave. · Newark 5, N. J. · MArket 2-4085

Calendar

(New York) Professional Exterminators Assn. February Meeting, Museum of Natural History, New York City, Feb. 10, 8 p.m.

Entomological Society of America Southwestern Branch Annual Meeting, Shamrock Hilton Hotel, Houston, Tex., Feb. 10-11.

Eastern Pennsylvania Pest Control Assn. February Meeting, Sylvania Hotel, Philadelphia, Feb. 13, 6:30 p.m.

Western Pennsylvania Pest Control Assn. February Meeting, Webster Hall, Pittsburgh, Feb. 13, 7:30 p.m.

Hollandia Supply Co. Annual Equipment Show and Service School, South Vienna, O., Feb. 20.

New Jersey Pest Control Assn. February Meeting, Rutgers University Entomology Building, New Brunswick, Feb. 19, 8 p.m.

National Sanitary Supply Assn. 35th Annual Convention and Trade Show, New York Coliseum, New York City, Feb. 22-25.

American Mosquito Control Assn. 14th Annual Meeting, Willard Hotel, Washington, D.C., Feb. 23-26.

Hawaiian Pest Control Assn. February Meeting, site unselected, Honolulu, Feb. 25, 7 p.m.

Pacific Northwest Pest Control Operators Assn. Ninth Annual Conference, Imperial Hotel, Portland, Ore., March 2-5.

Iowa Pest Control Assn. Spring Meeting, Student Union Building, Iowa State College, Ames, March 6-7.

Four-State Pest Control Conference, Town House Hotel, Kansas City, Kans., March 10-11.

CDC Insect Control Operational Training Course, Purdue University, Lafayette, Ind., April 7-11.

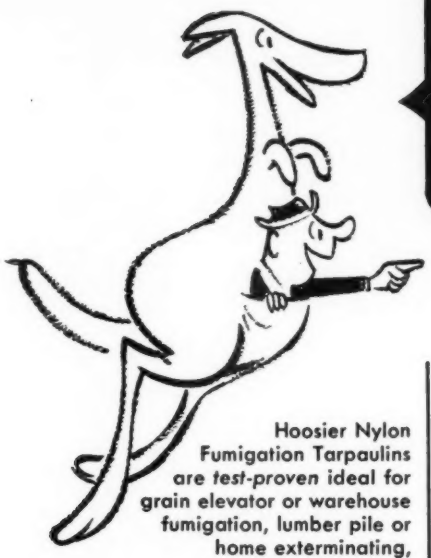
Chemical Specialties Manufacturers Assn. 44th Mid-Year Meeting, Netherlands Hilton Hotel, Cincinnati, O., May 19-21.

Pyrethrin Pamphlets

Two safety pamphlets promoting pyrethrins for dairy pest control are now available from African Pyrethrum Development, Inc., 65 Pine Street, New York 5, N.Y. One, "Safe Use of Pesticides on Dairy Farms," was prepared by the American Butter Institute. The other, "PYR Dairy Bulletin No. 1," was written by African Pyrethrum.

New Fritzsche Price List

The semi-annual price list of Fritzsche Brothers, Inc., suppliers of aromatic chemicals, is now available upon request. Copies of the two-color, 11-page price index can be obtained by writing the company at 76 Ninth Avenue, New York 11, N.Y.



Hoosier Nylon Fumigation Tarpaulins are *test-proven* ideal for grain elevator or warehouse fumigation, lumber pile or home exterminating, outside or indoors.

Get FAST and COMPLETE Protection with HOOSIER Vinyl Coated Nylon FUMIGATION TARPAULINS!

Immediate Delivery in any size.

Choice of Red or Green in Four Basic Weights

HOOSIER FUMIGATION TARPS are Best . . . *because*

- Tremendous Tear Strength
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- Dimensional Stability

Here is a typical use covering a complete house.

Hoosier can make any size cover needed.

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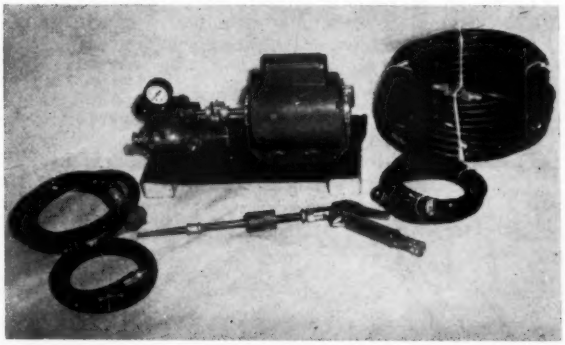
Our Specialty – Equipment for Termite Control Operators

WE HAVE A LINE OF PUMP AND SPRAYER UNITS

Tried and proven and engineered to meet your requirements. Electric or gas.



T&P Unit #	53	Roller Type	100lb PSI
T&P Unit	54	Piston Type	250lb PSI
T&P Unit	55	Gear Type	150lb PSI
T&P Unit	56	Roller Type	150lb PSI
T&P Unit	6500	Roller Type	250lb PSI
T&P Unit	5500	Piston Type	300lb PSI

Unit #56 illustrated above

√ Check These Items Every Termite Operator Needs

- Gear Pumps
- Piston Pumps
- Roller Pumps
- Electric Motors
- Gasoline Engines
- Pressure Regulators
- Pressure Gauges
- Termite Hose
- Suction Hose
- Re-usable Hose Clamps
- Strainers
- Flow Guns
- Needle Points
- Adjustable Spray Nozzles
- Fine Stream Sprayers
- Electric Drop Cord
- Electric Drop Connectors
- Inspection Lights
- Portable Electric Hammers
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- Portable Electric Saws
- Portable Electric Grinders
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- Compressors
- Air Hammers and Tools

Get our list on 1958 Foundation VENTILATORS and ACCESS DOORS.

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ASSOCIATED SALES & SUPPLY CO.

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Primer

How's Your Vocabulary: 2

Listed below are some common entomological terms and their definitions compiled by Purdue University's Entomology Department, these have been shuffled out of order by the editors of Pest Control to test your familiarity with common and other not-too-common technical expressions with which you should be acquainted. The pronunciation guide in italics below each word was added by Pest Control, in cooperation with the Cleveland Public Library, to help you learn how the words sound. Capital letters in the guide indicate where the emphasis is placed.

To test your knowledge of word meanings, see if you can match up the definitions with the correct terms. Thirteen correct is excellent; 11 to 12 good; 10, fair. Words in the monthly vocabulary Primers series for 1958 follow an alphabetical sequence, so you may want to clip and file each test for future reference or memory refreshing.

1. __articulate (v) *(ahr TIK yoo layt)*

2. __asexual *(eh SEK shoo'l)*

3. __auditory *(AWD eh tor ee)*

4. __basal *(BAY s'l)*

5. __bi-(prefix) *(bigh)*

6. __biochemistry *(bigh oh KEM us tree)*

7. __bisexual *(bigh SEK shoo'l)*

8. __bristle *(bris'l)*

9. __brood *(brood)*

10. __capitate *(KAP uh tate)*

11. __carbohydrate *(kahr boh HIGH drayt)*

12. __carnivorous *(kahr NIV uh ruhs)*

13. __carotin *(KARE oh teen)*

(a) two or two-fold, i.e., binomial, having two names, as in the ordinary system of zoological nomenclature, which consists of a generic and specific name — **Musca domestica.**

(b) to connect by a joint, to make jointed or segmented.

(c) an organic pigment, which produces the yellows and reds of certain insects. (Wardle)

(d) feeding upon flesh food.

(e) relating to the sense of hearing.

(f) with a head; that type of clavate antenna in which the club is abruptly enlarged at tip and forms a spherical mass.

(g) at or pertaining to the base or point of attachment to or nearest the main body.

(h) any one of a class of compounds which are prominent constituents of plants and animals, such as starches and sugars which contain carbon, hydrogen, and oxygen in proportion to form water; the most available sources of energy for the living cell.

(i) all the individuals that hatch at about one time, from eggs laid by one series of parents and which normally mature at about the same time.

(j) a stiff hair, usually short and blunt.

(k) without sex; having the reproductive organs incompletely developed and producing eggs or young by cell-budding; parthogenetic.

(l) biological chemistry; the chemistry of living organisms and of their functions, secretions, and parts; that branch of chemistry which concerns itself with the formation, constitution, and reactions of the chemical components of the living organism.

(m) having two sexes distinct and separate, in contrast to asexual.

Answers on page 60

KILL the odor

in insecticides and other strong smelling chemical specialities with

MALASCENT

Here is a new and amazingly effective reodorant for insecticide formulas. It quickly, efficiently and economically covers and neutralizes the unpleasant odors so often present in products used for pest control. Only ¼ ounce is necessary to reodorize a full gallon of insecticide formula—either oil or water based. Why not order a trial pound for your own tests. The low, low price is only $3.00 per pound.

Reodorize 1 gallon of insecticide for only 4½ cents.

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Ad Error

By error, the pump pictured in the January PC advertisement of Associated Sales & Supply Co. was the No. 6500 when it should have been the No. 56.

For Laying **POWDERS**

in the Right Places...

Use

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(Most Professional PCOs Do!)

A Necessity For Applying Powders to

Kill Resistant Roaches!

Silverfish and other crawling insects and for laying Tracking Powders in Rodent Control

Speedy, Neat, Economical

14 ounce	Professional
8 ounce	Standard Resale
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Low cost . . . easy to apply. A sure-fire extra profit service to offer your customers.

Bur-Co is a chemical bird repellent, guaranteed to keep birds away from ANY building, when used according to instructions. Eliminates unsightly — and damaging — bird droppings. Non-harmful to humans or birds. Does not damage buildings . . . replaces expensive, hard to install mechanical devices.

Comes in convenient cartridges, cans or drums. Easily applied to building with caulking gun or compressor for larger jobs.

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BUR-CO BIRD REPELLENT

Burr CHEMICAL COMPANY

Rockford, Illinois

4 powerful weapons for better PEST CONTROL

SPRAYING SYSTEMS

GunJet®

Series No. 42

SPRAY GUNS

For fast coverage and control. Throws spray up to 49 feet at 100 lbs. pressure. Adjustable spray, easy trigger control and lock. Hardened stainless steel tips. Choice of capacities. Write for Bulletin 80.

SPRAYING SYSTEMS

InsectoJet®

SPRAYER

Gives effective coverage in plant or room area 30x60 feet in less than two minutes. Highly atomized fog-type spray. Air pressure at 20 to 35 pounds siphons liquid from plastic jar. Jar unscrews for refilling. Write for Bulletin 74.

SPRAYING SYSTEMS

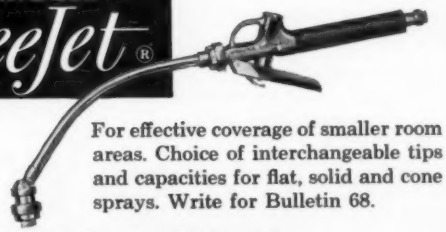
CHLORINE SPRAYER

No. 5870

Far reaching spray with air pressure. Quickly covers large area and hard-to-get-at places. Nozzle parts made of stainless steel. Write for Bulletin 76.

SPRAYING SYSTEMS

TRIGGER TeeJet®

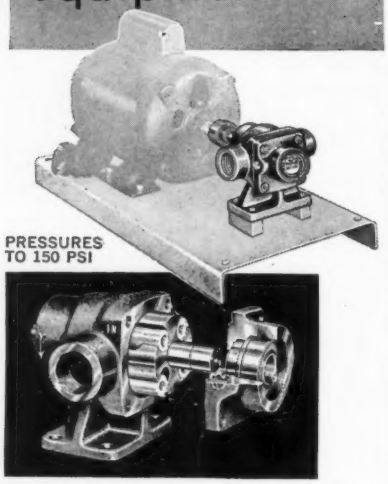


For effective coverage of smaller room areas. Choice of interchangeable tips and capacities for flat, solid and cone sprays. Write for Bulletin 68.

SPRAYING SYSTEMS CO.

3221 Randolph Street • Bellwood, Illinois

NOW . . . a pump that improves your termite control equipment

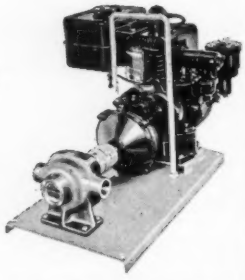


PRESSURES TO 150 PSI

FOR ELECTRIC UNITS

The Hypro Model N4000 ball-bearing pump with nylon roller impeller and Ni-Resist housing, is built for heavy industrial service, easily handles strong termite chemicals and fumigants. Delivers up to 5¾ gpm at 100 psi and 1750 rpm with ¾ hp motor.

FOR GAS-ENGINE DRIVE



PRESSURES To 200 PSI

The larger Series 6000 pump can be mounted directly on the "gear reduction" shaft of a gas engine for use in a pick-up truck or Jeep. Use it for weed spraying, mosquito control, transfer pumping, etc.

Write for detailed application data.

HYPRO PUMPS

HYPRO Engineering, Inc.

700 39th Ave. N.E., Minneapolis 21, Minn.

Infestation Report

Contains pertinent portions of the Department of Agriculture's Cooperative Economic Report, material from university entomology departments and reports from readers. PCOs noticing infestations in their own areas are urged to communicate with Pest Control so their information may be added to this infestation report.

IMPORTED FIRE ANT
(Solenopsis saevissima richteri)

Florida: Extension of new positive finds north of Hillsborough, River State Park, and found for first time south of Hillsborough River, Hillsborough County. Other infestations found near Wewahitchka, Gulf County and Fellowship, Marion County. These are first reported finds in Gulf and Marion Counties. **Louisiana:** Positive identifications received of specimens collected in Madison Parish. **Tennessee:** Inspections through southern part of Shelby County negative. **Texas:** A detailed survey begun in seven counties adjoining six known infested counties in southeastern area of state.

LARGER YELLOW ANT
(Lasius interjectus)

Maryland: Causing nuisance around homes in Caroline and St. Marys Counties.

TERMITES

Utah: Several additional homes and buildings found infested in Summit, Kane, Millard, Washington, Weber, Cache, and Salt Lake Counties.

Sub-Slab Fumigant Dispersion

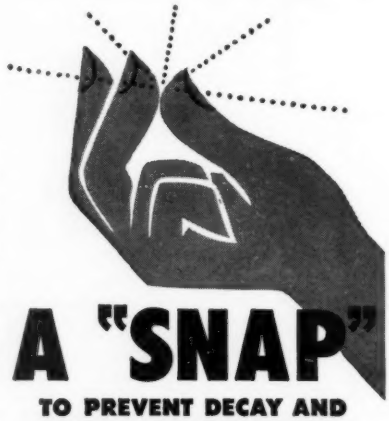
(from page 24)

the conditions existing at the time.

We must remember also that the termites themselves have to be considered. It isn't enough to be able to detect how far small amounts of gas have moved. The toxicants must either hit the insects initially at a very high level, or at low levels must remain in contact with the termites for many hours. Since few points of introduction are desirable in sub-slab fumigation, periods of long exposure after the gas has diffused are probably more effective.

With the chemicals that are presently available to us, fumigation is not a panacea for the cure of termite control problems in sub-slab situations. Too many factors are involved, not the least of which is the hazard to those occupying the building after the application is complete. Each case must be judged on its own merits and then a decision made as to whether or not fumigation is the answer.

New "Spot Fumigant Applicator," manufactured by Arwell, Inc., is particularly effective, according to the manufacturer, for insect fumigations in enclosed conveying equipment. The unit reportedly injects fumigant into an area as a finely atomized mist which vaporizes almost immediately, thereby affording fast penetration of cracks and seams of flour, grain, and ingredient handling conveyors. At an air pressure in the tank of between 35 and 50 pounds, about one ounce of fumigant is discharged every six seconds, Arwell claims. The applicator includes a five-gallon heavy-duty stainless steel tank equipped with stainless steel braided discharge hose lined and covered with vinyl. For more details, write Arwell's Product and Equipment Dept., 1119 Glen Rock Ave., Waukegan, Ill.



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TO PREVENT DECAY AND TERMITE REINFESTATION

Wolmanized

PRESSURE-TREATED LUMBER

Used to Replace Damaged Wood Assures Lifetime Protection Against Termites and Rot

Send for booklet and supply source

8 pages of data on when to use and where to get Wolmanized lumber. Write today.

W-45

KOPPERS

WOLMAN PRESERVATIVE DEPT.
KOPPERS COMPANY, INC.
763 Koppers Bldg., Pittsburgh 19, Pa.

GOW-MAC GAS MASTER

PORTABLE FUMIGANT T/C INSTRUMENT

MODEL 210-F

Used by Leading Entomologists in these Outstanding Investigations

Gow-Mac was used in fumigation of Makiki Church reported on page 18 of this issue.

METHYL BROMIDE & LIQUID FUMIGANTS
* Forced air recirculation in grain storage.
* Gas dispersion within all types of structures

ETHYLENE DI-BROMIDE
* Penetration and persistence in soil under slabs

FREON 12
* Determining concentrations in air

Save time and material by using a Gow-Mac Gas Master.

Write Dept. 210-F for details of new combination unit calibrated 0-100 oz. CH_3Br in air.

GOW-MAC INSTRUMENT CO.
100 KINGS ROAD, MADISON, N. J.

Don't Take Chances... Use Mallinger

METAL POISON BAIT CUPS

Lots of 10,000	$ 9.00 per M
Lots of 5,000	9.50 per M
Smaller lots	10.00 per M

FOB Pittsburgh, Pa.
PROMPT SHIPMENTS FROM STOCK

SAMUEL MALLINGER CO.

Forbes & Gist St., Pittsburgh 19, Pa.

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the largest structures ever fumigated were covered with

MINX tarpaulins

VINYL COATED NYLON
7oz. per sq. yd. $1.45

U.S. RUBBER FIBERTHIN
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Suitable materials for any types of jobs

COLORS — STRIPES
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EXTERMITAL OPERATORS

Here is your chance to get into a dignified, permanent business of your own — with an EXCLUSIVE franchise in a select territory — *unlimited earnings with a minimum investment.* We will train and assist you, because it is important that each of our Operators be an expert in this field. You will receive full co-operation based upon successful methods of other established Operators and highly geared advertising and sales promotion program. Our service is a necessity . . . every home-owner a prospect.

NATIONALLY KNOWN — WITH HIGHEST REPUTATION

In business for over 20 years, EXTERMITAL is recognized nationally for the satisfactory treatment of many thousand homes, public buildings and institutions. Our service is backed by a cash reserve fund of over $275,000.00. Write direct requesting interview, or additional information. Our present expansion program makes available many choice territories—perhaps your present location—so **act today!** Write to:

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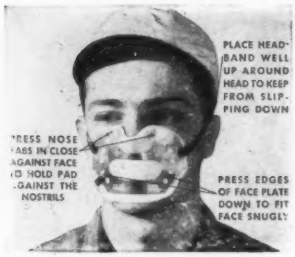
EXTERMITAL
SPECIALIZING IN TERMITE SERVICE
SINCE 1936

MARTINDALE

PROTECTIVE MASKS
give real wearer comfort


PLACE HEAD-BAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
PRESS NOSE BARS IN CLOSE AGAINST FACE TO HOLD PAD AGAINST THE NOSTRILS
PRESS EDGES OF FACE PLATE DOWN TO FIT FACE SNUGLY

Clean, cool, with large filter area for ease of breathing. Adjustable to all head sizes. Light weight - less than ½ ounce. Gives protection against over 400 nuisance dusts, non-toxic dusts except free silica. Cotton pad refills.

Protective Masks ..... $.30 ea.
No. 1 Refills (standard wt.) . . .02 ea.
No. 2 Refills (double-thick pad) .02½ ea.
Masks packed in individual envelopes
Refills packed 25 to a box
Minimum charge or C.O.D., $2.00
Minimum cash with order, $1.00
Postage paid on all cash orders.
QUANTITY DISCOUNTS AVAILABLE

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FLAME CHEK®

The greatest source of inflammability in offices, institutions, homes, etc., are such materials as drapes, curtains, rugs, carpeting, upholstery and bed clothing. The pest control operator, in his capacity of serving the public, can very easily offer a "Flameproofing Service."

FLAME CHEK, which can easily be applied by spraying, falls very easily within the scope of the modern PCO's operations and can add immeasurably to his volume and his business reputation.

FLAME CHEK has received the commendation and approval of fire departments all over the country. Why not write us today and investigate the opportunities that are available through offering a **"FLAMEPROOFING SERVICE"** with **FLAME CHEK.**

● ● ●

5 YEAR GUARANTEED
MOTH CHEK MOTHPROOFER

Many pest control operators are realizing extra profits by operating our 5 YEAR GUARANTEED MOTH CHEK MOTHPROOFING SERVICE. MOTH CHEK has been proven effective in numerous independent laboratory tests.* CHEK CHEMICAL PRODUCTS COMPANY, INC. issues a 5 year warranty against moth damage and assumes 100% responsibility in the event of a claim of moth damage.

* Results of tests available on request.

ALSO NOW AVAILABLE A COMPLETE LINE OF PCO CHEMICALS

Write today for complete information at no obligation.

CHEK CHEMICAL PROD. CO., INC.
Dept. PC 10, 89 Madison St., Newark 5, N.J.

Notebook

TIPS AND IDEAS FROM THE FIELD

Dermestids on Termite Diet

By Ron Hunt
District Public Works Office
Eleventh Naval District
San Diego, California

Ever hear of dermestids feeding on termites?

In November, 1954, a frame-on-slab industrial building was fumigated with methyl bromide for control of the common drywood termite (**Kalotermes minor**). The fumigation was conducted under rigid Navy specifications and was carefully checked with a "Gow-Mac" thermal conductivity dosage indicator.

About 26 months later, carpenters repairing portions of the building claimed to have discovered active termite infestation in a 2"x4" plate and one piece of 1"x6" sheathing.

The damaged wood was split open and the so-called "active termites" were found to be the larvae of the beetles in family Dermestidae, **Trogoderma ornatum** (Say). These scavengers were feeding on the many dead bodies of termites which remained in the tunnels.

Have any other readers had similar experiences?

K-State Research Grants

Kansas State College at Manhattan has been given nearly $30,000 this year for research into protection of stored products and their users.

The U.S. Public Health Service contributed $12,420 for research into environmental influences on insects in stored products; $10,000 was given by Frontier Chemical Co., Wichita, Kansas, for studies on the significance of toxicant absorption in relation to effectiveness of grain fumigants; while another undisclosed sum contributed by Diamond Alkali Company of Cleveland will be used to determine factors affecting toxicity of certain fumigants against stored grain insects.

Kansas State also reported a $2,000 grant, which will be spent on the classification of the insect order Diptera, which includes houseflies, mosquitoes and gnats. No source for this money was revealed.

YOU NAME IT — MAGNOLIA HAS IT

TERMITE CONTROL CHEMICALS

MAGNOLIA DIELDRIN
18-62/100% by weight
MAGNOLIA CHLORDANE
46% - 74% Water Miscible
22% Oil Solution
MAGNOLIA PENTACHLOROPHENOL
44%

Have You Tried DAMATAM E40 40% Roach Concentrate?

Magnolia Has A Complete Line of PCO Chemicals

Shipped Same Day Order Received

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Entomological

MODELS

Improve Your Advertising with these Traffic-Stopping MODELS and DISPLAYS

New Improved Models will be For Sale March 1, 1958

New Shipment of Butterfly Pins Now In Stock

We Sell
One-Minute Animated TV Film
of **"WOODY and BUZZ"**, the two unhappy termites. Now at a price all can afford. Territorial rights granted. First come, first served.

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25 YEAR OLD FIRM has opening for supervisor of our Exterminating Department. Must be steady and no drinker. Please state your practical experience in full. Unlimited salary opportunity. Box 461, Pest Control magazine.

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WILL BUY ALL or half interest in small or large exterminating business Southern Florida area. Licensed owner may remain active if desired. Can furnish financing for expansion and produce new accounts. Reply in detail. Confidential. Box 462, Pest Control magazine.

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TERMITE AND PEST control business with exclusive franchise. Now earning $9,000-$15,000 annually in medium-sized Midwestern city. Completely equipped. Terms available. Box 454, Pest Control magazine.

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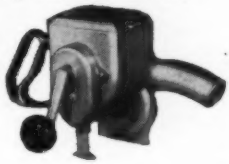

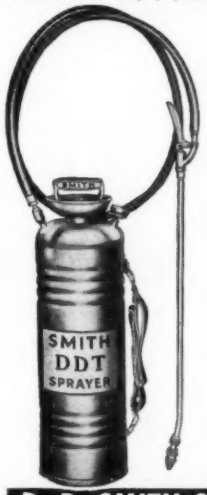

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Pestales

Professional versatility. PCO John Cook of Decatur's North Alabama Termite Control Co. doesn't confine his talents to pest control. John not only installed his own termite control system in his new, contemporary home completed recently in Decatur, but also designed the residence himself. It includes such ultra-modern fixtures as an inter-com system and special lighting with regulated dimness controls. Besides his experience in managing North Alabama Termite Control, which operates 26 vehicles out of three general offices in North Alabama, John has an architectural degree from Georgia Tech, a license in architecture, and two years of teaching experience in architecture.

* * *

Bad apple. Dallas, Tex. police, probing a larceny in their own backyard, finally solved the case that started with a box of apples given to the deparment as a Christmas gift. In the back room where they were stored during the holidays, someone or something kept delving into the fruit, and everybody on the force was suspect. Complained Dallas Police Capt. Will Fritz before he uncovered the culprit, "It wouldn't be so bad if the guy would take one apple and eat it. But he takes a healthy bite out of one and then puts it back. He's spoiled them all." The long arm of the law still was not long enough, however, to catch the thief, a brazen, fur coated, apple gorged Norway rat, who escaped up an air-conditioning shaft unharmed. *A "cool Yule," as slangsters, would phrase it.*

* * *

PCO contest winner. Only pest control company to win a prize in Velsicol Chemical Corp.'s Chlordane "Show and Sell" Contest for 1957 was General Sanitation Co. of Philadelphia, Pa. General Sanitation picked up a regional second place in window displays, worth $250, plus apparently a lot more in increased sales volume. According to Velsicol, General Sanitation's retail sales of Chlordane doubled during the period the display was up.

* * *

Espionage. In Sweden, rats grounded the country's only night fighter squadron by gnawing through radar cables encircling the airfield where the planes were based. *Radar has its merits, of course, but a more dependable air-ground defense for Sweden might be a pest control operator with a pair of binoculars.*

* * *

Announce Amy's arrival. Stanley Lind of Chicago, Ill.'s American Laboratories, and his wife, Bundy, have a new baby girl, Amy Carol. She was born December 10 and weighed in at 8 lbs., 4 oz. In a Christmas card to us, Stan enclosed a snapshot of daughter Amy, taken when she was only six hours old.

* * *

Regal rodents. Even the Queen of England has mice. The British Ratting Co., a rodent control outfit in East Grinstead, England, has been summoned by Britain's royal household to control mice in the Queen's private residences, such as Sandringham, her country estate. Buckingham Palace's mice, however, are the responsibility of Parliament. *Apparently mice can't be entirely legislated out of existence, even in the British Isles!*

* * *

New B at B & G. A baby boy, 4 lb. 12 oz. Philip Hammaker, is the newest addition to the Cleo and Bill Brehm family of Plumsteadville, Pa. Pop is president of B & G Co., equipment suppliers to this industry. Philip has three brothers, Robert, George, and David.

* * *

Mad at Madame? In Penarth, England, a 77-year-old dowager—frightened by a mouse in her pantry—fell, broke her leg, developed pneumonia, was seriously ill for months, and died. *The butler couldn't have done a more thorough job.*

* * *

To Planning Board. Martin T. Meyer, Theodore Meyer Estate, Philadelphia, Pa., has been appointed to the Planning Commission for Cheltenham Township. Wonder if "planning" calls for employment of a professional PCO to handle township pest control problems? Such community service is valuable all around. Congratulations, Martin.

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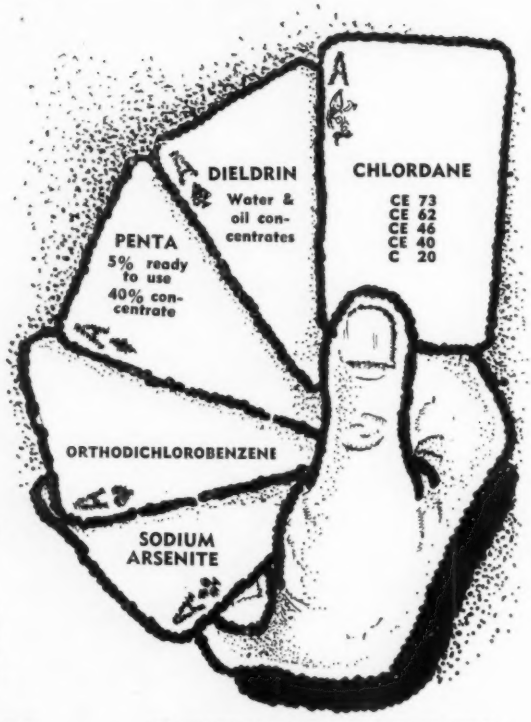

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